Carriers baby-step toward TMN ■ Exclusive look at ADSL rollouts

America's Network

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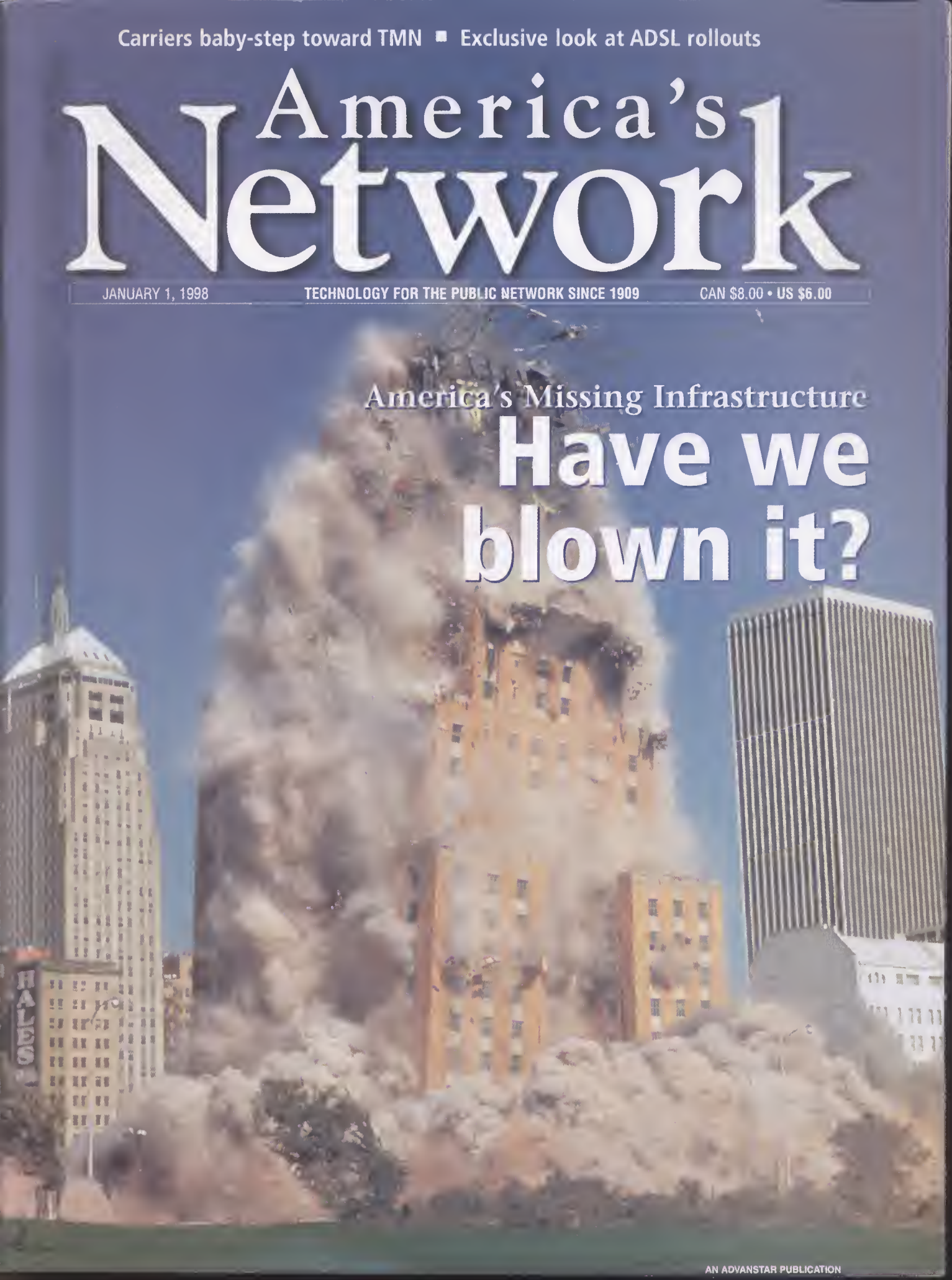

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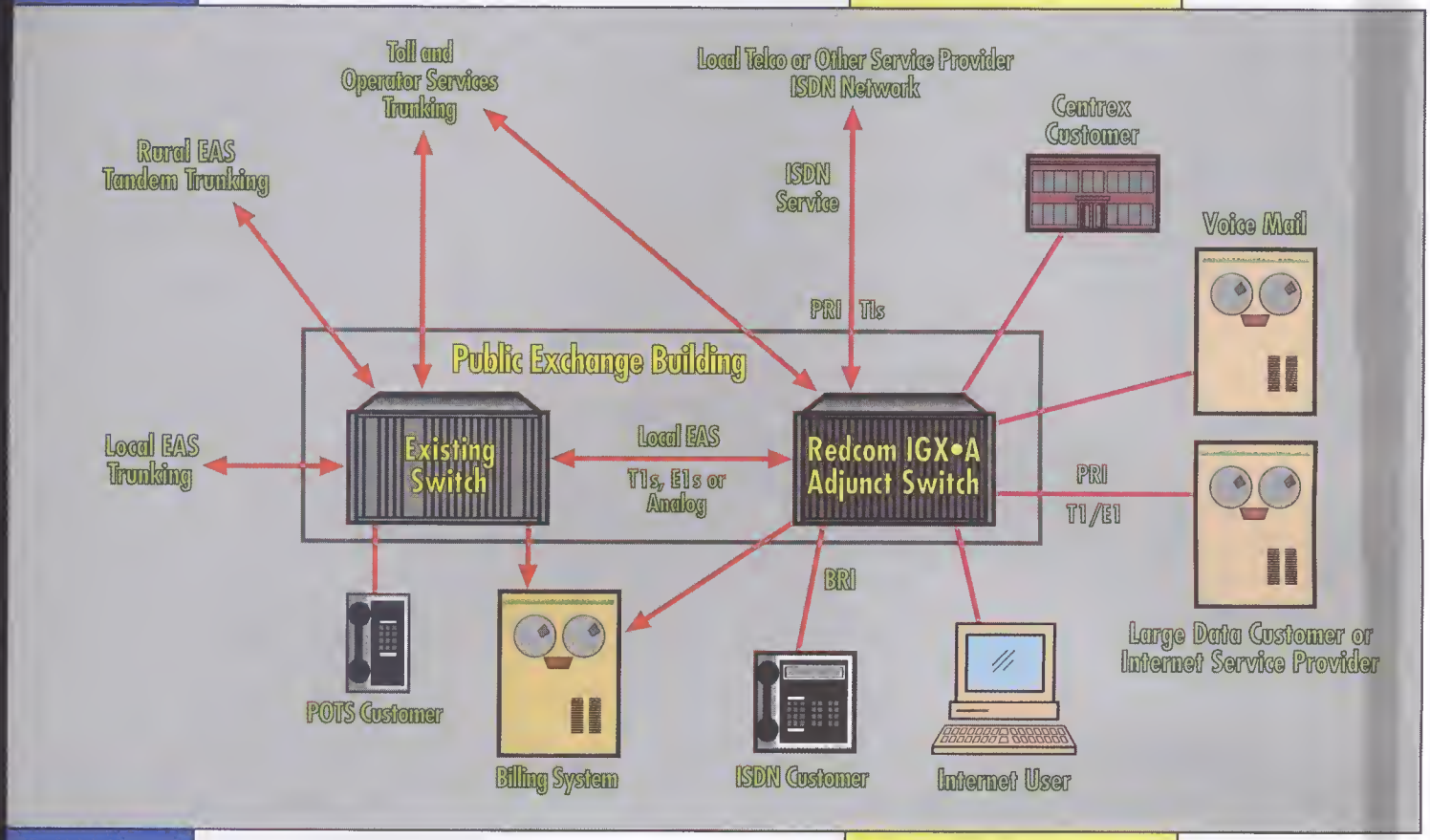

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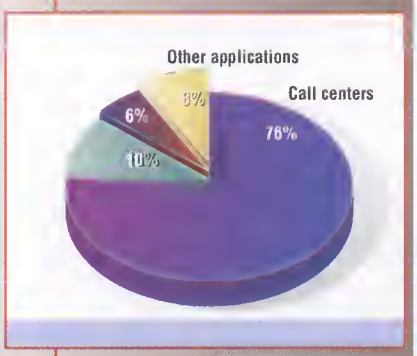

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January 1, 1998 • Volume 102 • Number 1

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SPECIAL REPORT

SERVICES

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WIRELINE

INTERNET

MARY SLEPICKA

Doomsday cometh

Two months ago, contributing editor Alan Stewart asserted that telecommunications today is more about "throwing new technology at the network" than it is about fulfilling societal and business needs ("Blueprint for broadband," Oct. 1). Indeed, it seems we've thrown so many new layers of technology at our public switched telephone network that it's now in danger of falling in on itself.

"The Internet has proven the need for a public data network, but this 30-plus year old network is just not suited to meet the explosion of applications, uses and number of users that it is—and will continue to be—asked to handle." So says Peter Heldman of the Telecommunications Planning Institute (Denver), who, with his father, Robert Heldman, have authored a series of thought-provoking (and, hopefully, somewhat disturbing to those who love *status quo*) articles in search of "America's Missing Infrastructure," the first essay of which is found on pages 10–12.

Steps taken in 1998 and 1999 and beyond will set the course for telecommunications in the new millennium. "But to realize this, the industry must move its efforts from the courtroom to the marketplace, and begin building the correct, new, public network infrastructure required to support the exciting new advanced data, video and multimedia applications users require," Heldman says.

"America's Missing Infrastructure" will appear four times in the next three months.

The new year brings evolution at *AN*. Senior editor Charles Mason, a veteran telecom journalist with eight years of specific experience covering the wireless sector, becomes *AN's* Wireless Editor. We can think of no other industry journalist who will be able to provide the facts and perspective as Mason will, and as he has demonstrated in several cover stories for this magazine.

Senior editor Annie Lindstrom utilizes her many years of experience covering broadband (ATM and high-speed data) and mid-band (ADSL, ISDN, etc.) technologies as *AN's* new Broadband Editor. Lindstrom has a rare talent for taking a "whole network" approach when conceiving and carrying out stories, as her analyses on xDSL testing and deployment have proven in the past year (as well as in this issue—see page 39).

Mason will assist Lindstrom in the Broadband section by continuing his coverage of technology issues pertaining to CATV and multimedia applications. Those wishing to contact any of our editors can find phone/fax and e-mail information at right, and additional information on our Web site: www.americasnetwork.com.

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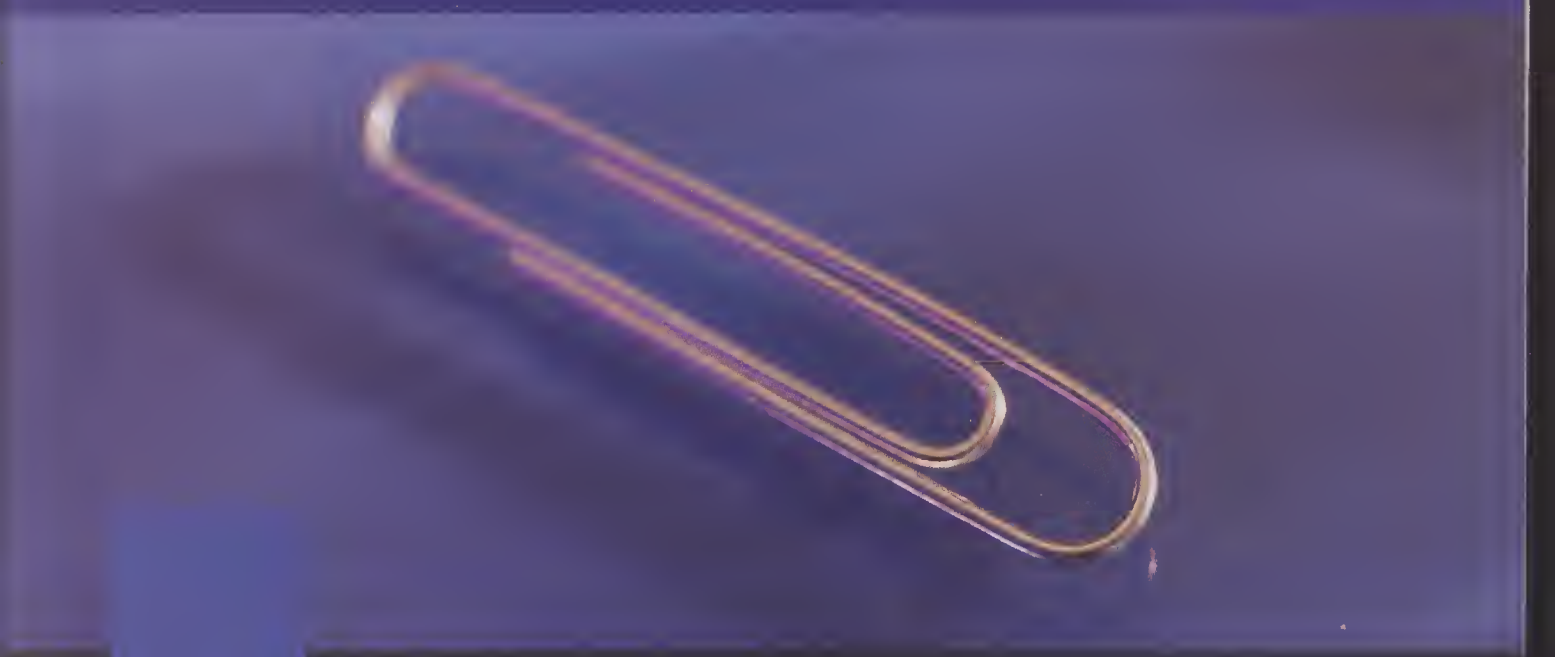

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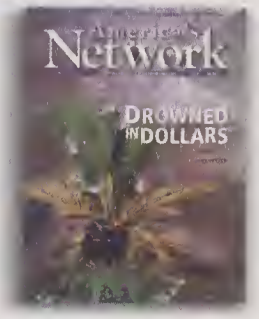

I just read Shira Levine's editorial ("From the Editors, Nov. 15) on the "snubbing" her father received from AT&T after being a "loyal" customer with them for as long as she could remember.

This characterizes the trend of American Big Business: Look only at the bottom line. This is true with AT&T, Ameritech, my company (Southwestern Bell Telephone) and probably with your magazine.

We recently acquired PacBell. I met with their subject-matter experts dealing with digital loop carrier (universal and integrated) and they say the average service age in the planning and engineering section is only one or two years. They have shocking tales about the ignorance of their employees. (I don't use the term *ignorant* in a demeaning way; I mean they are "unlearned" in what they are doing.)

Your telemarketer from Ameritech may have been a "temp" with just enough information to get in your front door. How do you know the person even works for Ameritech? SWBT sells CPE that isn't made by our company, and yet it carries the Southwestern Bell name on it. With more and more automation, you are lucky to have a human call you. These "temps" help with the bottom line on expense.

When a company is run with only a bottom-line objective, you soon find the old and loyal customers ignored. Why? The bottom line is a number, and Shira's father probably is just not that big a number. I agree that he should have been contacted. We have the greatest telephone network in the world, built with customers like Shira's father.

When AT&T separated itself from all of its operating companies, everyone feared the collapse of SWBT. Why? Because the big dollars were from the big-number accounts. Well, look at us now. SWBT is on the same line with AT&T. SWBT has jumped on the local market with both feet. SBC (our holding corporation) was started with SWBT dollars from all of these little accounts.

Southwestern Bell Telephone still commands the lion's share of SBC's revenues. If you look at the profit margin, we don't compare with some of our small companies, but consider what Sam Walton did with a small profit margin with the little people.

Bob Rutledge
Manager–OSP planning and integrated planning
Southwestern Bell Telephone

Indeed, the bottom line is The Bottom Line for most companies, and the overriding quest toward maximizing shareholder value probably only will escalate as the telecom industry becomes more deregulated and competitive.

Management guru Tom Peters says the "over-30" generation can't compete with the technical and computer savvy of its younger counterparts. So it's up to us to put the "humanity" back into big business. Which customer service rep would you rather deal with: the anonymous voice at the other end of the 800 number who just keys in information (that you usually have to spell out—twice), or the guy named Dave who, in responding to your request for Internet service prices, asks you in the meantime how you're liking the new Caller ID service you signed up for six months ago?

While the telecom industry is seeing a large influx of new professionals, perhaps with only a year or less of experience, it's up to America's Network *readers (most of whom have been in this industry for more than a decade—see our Dec. 15 Careers in Communications Outlook) to make sure these entrants are trained properly and are aware that the customer ultimately is the one that enables paychecks to be issued.*

In defense of America's Network, *yes, the publishing company that owns us is pretty much bottom-line driven, but hey, taking care of the readers is why God created editors, right?—Ed.*

A SNUB-LESS WORLD

We couldn't more agree with [Shira Levine]. The telecommunications industry is in the midst of a rapid transformation, from a regulatory-driven industry to a competitively driven one. With that comes the race to acquire customers at any expense in order to gain share fast. In the process, valued customers can be lost without notice, as was apparently the case with Levine's father. They also can be mistakenly telemarketed as if they were not customers, as was the case with Shira Levine.

So, the question is, Why aren't telecommunications companies doing anything about this?

As Levine pointed out, many of them have data warehouses filled with information about their customers, but they don't know what to do with this information.

However, some companies are starting to turn their data warehouses into valuable operational assets, using them to get to know their thousands or millions of customers, and provide them service on a one-to-one basis.

Other industries, such as banking and financial services, have become rather sophisticated in their use of data warehouses for marketing, sales and customer service.

In the future, we will come to expect that, when we call our telecommunications provider, it will know who we are and what our profitability is on the first ring. Before they even answer the phone, they will be equipped to service us at precisely the level we require, and they will be in a position to sell us exactly what we need at exactly that time.

When you put a multiplier effect on this, across millions of customers, you can see what an incredible financial impact this could have, positively or negatively, depending on whether they get it right. This is where the market is headed. Those who don't get on board will be left behind in the wake of those who do.

Steven D. Runkel
President and COO
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Circle 102

RUPERT BAINES

What's next for xDSL?

All hype aside, xDSL keeps up the hectic pace.

As ADSL grows more stable with maturity and a growing number of shipping products, an inevitable degree of differentiation will occur.

The digital subscriber line (xDSL) community is buzzing, with *real* developments and diversification almost keeping pace with the massive media hype surrounding them.

Discussions are well advanced on Issue 2 of asymmetrical DSL (ADSL) T1.413. With the letter ballot complete, editing and reconciling the various comments are left before the new edition of the standard is published–which will be used as the baseline text within the International Telecommunications Union (ITU) study group.

CH-CH-CHANGES

Many of the changes has been to update the standard with the benefit of the last two years' experience. One specific change is to integrate asynchronous transfer mode (ATM) Transmission Convergence layer, so that the ADSL spec can be defined as a Utopia-Utopia connection, instead of a simple bit-pump. There are also some additions to the management and communications protocols to make these richer and more suitable for end-to-end connectivity and the associated management.

ADSL's rate adaption had to be described. ADSL has always been rate adaptive, but the training and management protocols used for interoperability needed standardization.

The big ADSL debate over line codes has now been resolved: ETSI and the ITU have decided on DMT. Probably the only controversy to be resolved within Issue 2 is that of spectral mask, to ensure that ADSL doesn't cause any crosstalk that would prevent very high bit rate DSL (VDSL) from working.

Outside the standards bodies, there is an increasing focus on end-to-end solutions. The trend is moving toward interoperable end-to-end solutions, based on a protocol stack of PPP over ATM over ADSL. This scalable approach provides seamless connectivity, easy integration into the backbone, and a migration path to a full service network.

ADSL LITE

But as ADSL grows more stable with maturity and a growing number of shipping products, an inevitable degree of differentiation will occur. For example, one ADSL concern focuses on cost and inconvenience of installation: a POTS splitter, and new wiring to the computer; hence splitterless ADSL. This meshes with the idea that ADSL is "too powerful" for mass market applications Together these are described as "ADSL Lite,"an idea that has gained a lot of acceptance very quickly—several major PC OEMs are already developing products based on it, and the ITU has a study group working on a standard, which will be interoperable with T1.

The corollary is that central offices are likely to install "ADSL heavy" all of the time. Installation, training and management are significant costs, and the time scales are longer; installing a single product that supports both services will have a longer useful lifetime.

Personally, I'm less convinced by the arguments in favor of low rates for three reasons: in terms of the end-to-end system the cost saving is trivial; is any amount of bandwidth really "enough?"; and will consumers really prefer DSL at 500 kbps when cable modems promise 10 Mbps?

MORE XDSL DEVELOPMENTS

Another significant development is ADSL over integrated services digital networks (ISDN). In much of the world, ISDN is widely deployed for both data and voice services. Germany alone has installed 2.7 million lines. Many small/home office users want to receive ADSL data without losing their (ISDN-based) voice line. The problem is that ADSL was planned to fit over plain old telephone service (POTS), and conflicts with ISDN signals. The proposed solution is to shift the upstream of the ADSL (above 170kHz), letting it co-exist with ISDN.

Symmetric DSL (SDSL) aptly describes the (somewhat oxymoronic) Symmetric ADSL (e.g., by changing the up/down allocation of normal ADSL chips to give the same rate in each direction). Significantly, this operates over POTS and could deliver 2+Mbps in each direction over the full CSA distance.

The consensus regarding these developments is that we don't need to define a new set of standards, but should focus on a scalable range of interoperable options instead. ■

Rupert Baines is product manager for ADSL chipsets with Analog Devices (Norwood, Mass.). He can be reached at rupert.baines@analog.com

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SPECIAL REPORT

PETER K. HELDMAN AND ROBERT K. HELDMAN

America's Missing Infrastructure

Part 1: Spinning the user

After 30 years of building, have we blown it?

THE UNITED STATES IS AT A CROSS ROADS. FOR MORE THAN 30 YEARS, THE NEEDS OF DATA, VIDEOCONFERENCING AND MULTIMEDIA USERS HAVE BEEN IGNORED AS THE INDUSTRY REFUSED TO UTILIZE ADVANCES IN DIGITAL AND OPTICAL TECHNOLOGY TO BUILD NEW, ADVANCED NETWORKS. THIS HAS BECOME AMERICA'S MISSING INFRASTRUCTURE. WITH THE PASSAGE OF THE TELECOMMUNICATIONS ACT, TECHNOLOGICAL ADVANCES AND MARKET DEMAND FOR THESE SERVICES, THE NEED FOR A NEW INFRASTRUCTURE NO LONGER CAN BE IGNORED.

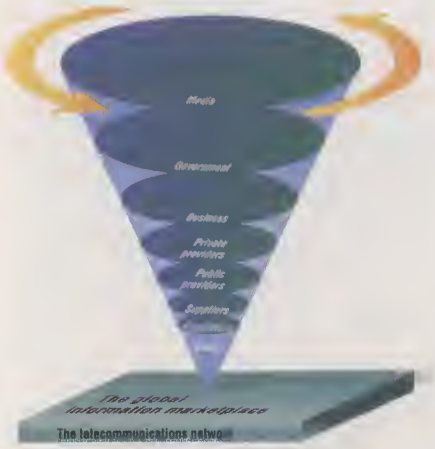
THE FOLLOWING IS THE FIRST OF A FOUR-PART SERIES OF ESSAYS THAT DISCUSS WHAT HAPPENED TO THE U.S. NETWORK INFRASTRUCTURE, AND THE POTENTIAL OUTCOME OF THE INDUSTRY'S CURRENT PATH. UPCOMING ARTICLES WILL DESCRIBE THE NEW ROLE FOR INDUSTRY AND GOVERNMENT LEADERS TO ENABLE THE NETWORK TO THRIVE IN A COMPETITIVE ENVIRONMENT, AND WILL CONCLUDE WITH A DISCUSSION OF THE KEYS TO SUCCESS IN THE COMING MILLENNIUM.

Spin! Spin! Spin! Where will the end user end up? Communications users are under attack as numerous forces attempt to push or pull the network infrastructure in different directions—all of which are far from the straight and narrow path needed by the information user.

Network providers and governments must protect users from these contradictory influences, while teaching them how to best utilize the ever-expanding capabilities of narrowband, wideband and broadband services. What can business and government leaders do to assist the users in today's environment?

The mist of the last 35 years has dispersed to expose parties that wish to destroy the current voice network by burdening it with layer-upon-layer of diverse data and video traffic. Who are these parties, and what are they doing? More importantly, how can service providers and end users confront the onslaught, and survive?

Once a situation is identified and understood, then it can be addressed properly, but much needs to be done before the opportunity is gone—before users are lost to more aggressive, knowledgeable players elsewhere in the global arena.



AT THE BOTTOM OF THE TOP

The user is positioned at the tip of a spinning top, where the point meets the network platform infrastructure and spins here, there and everywhere. At the other end, widening layers of forces (regulators, suppliers, public network providers, private network operators, business, government and the media) apply pressure downward, toward the tip. At each layer, a particular group's string winds around the top; when released, it creates a powerful force, spinning the top in a desired direction. Now is the time to take control of that spin.

Frustrated commuters in every city struggle around plowed-up streets, as new players in the telecommunications game install private or specialized fiber optic cables. Where are the public information highways that would have allowed businesses to ring cities with fully interconnected electronic offices, enabling companies to move to more remote locations and permitting employees to work from home? Do major businesses have to construct their own point-to-point networks, plowing up streets only to dig them up again later to extend capabilities for their own, separate needs? Where is the universal, interactive data and video network infrastructure?

HOW DID WE GET HERE?

We've seen Western Union transport 60 and then 100 words per minute, five characters per word, with each character sent in a series of "on" (ones) and "off" (zeros) signals in 5-, 7-, or 8-bit patterns, encased in transport packages with start/stop protection envelopes. Military systems later provided similar capabilities; during the Cuban missile crisis these low-speed transport vehicles (operating at 300, 600 and 1200 bps) delivered crucial messages, helping to prevent World War III.

AT&T had a family of data modems operating from 300 bps to 2400 bps, and then from 4800 bps to 9600 bps. Unique patterns of seven bits of ones and zeros represented each of the 256 alphanumeric characters. This was the data-transport game of the 1960s and 1970s, where the telephone network, carrying switched voice calls, also could carry minimum amounts of data (at reasonable error rates) at 2400 bps. Higher-speed data was sent over specially conditioned facilities featuring expensive monthly leases.

Later, computer programmers wanted to access their mainframes from remote locations at faster and more economical transmission rates. To address their needs, internal computer transport links called buses (which handled internal data throughput, moving information from local data-entry systems to internal processors and then to output devices) were extended to form local area networks (LANs). Programmers now could converse on-line with the centralized mainframe.

As the 1970s progressed, specialized internal data links, using transport interfaces and transfer mechanisms (unique to each computer) moved information around the office, factory and complex. IBM 360s became 370s, and Snow White (IBM) and the Seven Dwarfs (Wang, Digital Equipment Corp., NCR, Boroughs, Control Data, Sperry Rand and Honeywell) kept boosting their mainframe capabilities. Computer applications moved from payroll and finance into inventory control, engineering and manufacturing. CAD/CAM became commonplace. U.S. standards groups attempted to rally around Digital's Ethernet IEEE 802 common interfaces to construct LANs, using a multitude of access and transfer options.

The 1980s attempted to interlink these disparate systems from floor to floor, building to building, town to town and region to region, using bridges and routers to recognize addresses so information could be moved from LANs to wide area networks (WANs) to metropolitan area networks (MANs). Voice-grade data modems operated at 2.4 kbps, 4.8 kbps and 9.6 kbps, and information moved over leased facilities at 14.2 kbps, 19.1 kbps and 56 kbps rates.

The world become more interconnected, and started using more complex protocols and expensive facilities. The voice network was continuously called on to move either extremely long or extremely short holding-time traffic—a capability for which it was not designed. Still, government officials continued to champion this mode of operation as the new information highway. Businesses were destined to remain in the world of low-speed, dial-up transport or expensive, leased facilities, or perhaps using compressed cable solutions in which security, survivability, ubiquity, privacy and addressability fade into the future for another generation to pursue. These Humpty Dumpty networks are about to fall down.

There is still no public data network to serve all of the data users transmitting text, graphics, images, photos, videos and simulated information. The only vehicle to use is plain old telephone network (POTS), while we wait for the "pretty awesome new services (PANS)" that new networks could offer. Unfortunately, the longer we wait, the only alternative is "public information pipeline equipment services (PIPES)" for non-switched, point-to-point, raw bandwidth—an expensive proposition.

The Internet's primary goal was to establish service platforms that enabled access to its hundreds of databases, using old store-and-forward techniques derived from Advanced Research Projects Agency (ARPA) university messaging systems and operating at low speeds over free transport mechanisms (first paid for by the Defense Department and then by government-supported programs using interexchange carrier long-lines data transport and local, non-usage-sensitive, free-calling-area, voice-grade networks). This hodgepodge data

overlay was promoted as the answer to the next wave of micro- and miniprocessors in the home. Users set up calls and left connections up for a week (sometimes a month) once they found a relatively error-free circuit. It's now the "in thing" for everyone to have a page on the World Wide Web—a wide, open game with no rules, no restrictions and no concern whether this mode of communication will destroy the traditional voice network.

The Internet has grown so much it's become gruesome. Now, an entire crop of business users want to add short (very short) holding-time calls for electronic on-line banking and financial point-of-sale transactions, as these types of datagrams migrate from closed, private LANs to the open network. We haven't seen anything yet in security, fraud and theft problems that will occur from this migration.

We've watched the computer advance from central to distributed to remote processing, progress from mainframe to front-end to mini- and then microcomputing, and move from raw manipulations to fuzzy logic. Unfortunately, the tremendous technological advances in communications transport capabilities have not moved out of the telecommunications research laboratories, principally because network service providers resisted any change to their 100-year-old operations monopolies.

Even after the first shoe dropped—the 1984 divestiture of the Bell companies from AT&T—local and long distance services changed little when it came to providing new data and video services. For example, while a videophone can operate at all levels of quality and resolution, no one can afford the $100/hour price for medium-quality video conversation at 1.5 Mbps, or more for the higher quality conversations at 45 Mbps.

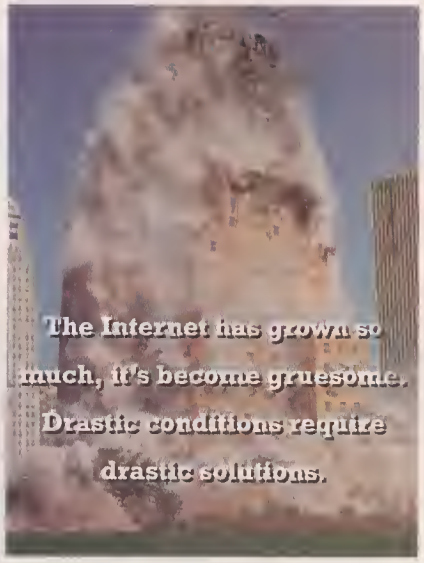
Costs are way out of line with technology advances. Information can be moved economically at 128 kbps to 155 Mbps (and eventually to 622 Mbps). The letter "A" can be represented in 8 bits, and a dot in a high-resolution videophone matrix of 1,000 x 1,000 lines requires 24 bits to cover the full-color spectrum. The *Encyclopaedia Brittanica* can be transmitted in a few heartbeats.

Indeed, the United States has come a long way from the 60-word-a-minute telegraph days. But as brownouts, blackouts and blowouts occur, we continue to misuse the voice network that was originally designed for a specific type and load of voice traffic, because we burden it with abusive forms and concentrations of overlaid data.

DRASTIC SOLUTIONS

Drastic conditions require drastic solutions. Back in the 1920s (before the Crash of '29), there were five phones on a stockbroker's desk—all connected to different centers. There were 29 different telephone companies in downtown New York. Do we need to experience that again, now that the second shoe—the Telecom Act—has dropped? Isn't it time to be smart, for network providers to play smart, and for the states to look after their constituents?

It is time to begin planning to construct the right telecommunications infrastructure, one in which communication replaces transportation.



Exploding needs for advanced, integrated data, video, multimedia and enhanced voice services—coupled with the open, competitive environment commissioned by the Telecom Act—create awesome opportunities for new industry leaders who break out of the traditional telecom provider "connect and collect" mentality.

These leaders will build the new, advanced infrastructure, one that meets and creates emerging market needs and opportunities. Those that cling to the monopolistic tenants of the past—providing limited offerings and few features (at high prices)—will be left in the dust. Leveraging the many advanced digital and optical technologies (now laying dormant on the dusty shelves of the world's great R&D laboratories), these new leaders will enjoy large slices of the rich information market pie.

Today's challenge to service provider executives and government leaders is to formulate and execute proper plans to build the right telecommunications network infrastructure. This infrastructure should support the right narrowband and broadband services, and be addressable, switched, interactive, secure, survivable, robust, connectable and maintainable. These leaders will need to be focused in the right direction, applying a positive force to counterspin the telecom network infrastructure top. ■

About the authors:

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SPECIAL REPORT

FRANK BERNHARD

CTI services satisfy converging landscape

Mediating data and telephony results in declining cost of ownership.

In a world where transport technologies are learning to co-exist, a new paradigm of communication strength has quickly garnered the attention of the world's largest call centers. At the crux of the historic battle between information technology and telephony stands a technology blueprint that likens itself to a new platform, complete with a rigid set of standards and open flexibility for application development.

Introducing the spread of computer-telephony integration (CTI), and the wealth of economic benefits carriers can deliver to enterprise customers through services that provide operational efficiency and the seamless link of network resources. CTI has begun to preserve the investment at the desktop by consolidating hardware and maintenance requirements, making data and voice synergistic.

While many organizations radically oppose the marriage of voice networks to data backbones, convergence of media does extend user functionality. Given the present deluge of voice, video, imaging and text, any system that enables change in the mediation of parallel sources should be examined to understand the organizational impacts associated with blending functionalities. Although not every entity operates as a call center or struggles with high-call volume, the market for CTI promises solutions in multimedia communication and groupware messaging; moreover, with accelerated demand for knowledge transfer, CTI enables systems to collaborate to uplift the users' assimilation of information as it pertains to their use of the network.

CONVERGING TECHNOLOGY

CTI enables local area networks (LANs) to be leveraged into voice-processing applications. The popularity of voice processing's customer interface tools among telecom management groups has soared primarily because of the technology's ability to make network architectures support voice and data.

One of the strongest CTI applications of voice processing may be found integrated voice response (IVR) solutions. An IVR system lets callers interact with information technology databases and complete a transactional response similar to the way a customer service representative would manually search for the same data. The network ensures voice flexibility and maintains data transport without additional capital investment.

CTI emphasizes *integration*, in which the objective is to improve efficiency and enable effective distribution of resources. Where most automation efforts replace components of the process, an integration methodology ensures the support of current resources by adding to the overall efficiency to produce measurable savings. Because additional resources become available, the organization may realize substantially lowered expenses in building and maintaining CTI solutions.

REDUCING THE TCO

Total cost of ownership (TCO) is more than a management buzz word. Theoretically, the financial community values a

Table 1: CTI Functions

Application Controlled Routing—Incoming calls	Integrating the computer to route calls to specific groups.
Application Controlled Routing—Outbound calls	Integrating the computer to initiate outgoing calls to specific groups.
Call Monitoring	Recording information that pertains to the call session.
Caller Data Extraction	Allowing call information to be displayed on a terminal.
Data Transfer	Transfer of bilateral data from a call to an application.
Interactive Voice Response (IVR)	Automated connection of the caller to the computer.
Message Exchange	Interchange of message data between the PBX and computer.
Terminal Based Telephony	Using a terminal for call execution and monitoring.
Voice and Data Caller Association	Synergy of voice and data transfer during the call.

Recent CTI and call center industry data reveals declining ownership costs by merging data and voice. The coupling of cost reduction and enhanced performance builds a solid business case for deploying CTI services.

technology solution's cost burden at an amount equal to the aggregate expense associated with procurement and maintenance throughout its lifecycle—including firmware additions, software modification and training. With regard to CTI projects, analysts are discovering a favorable cost equation that signifies reasonable gains in reducing operational overhead expenses. The coupling of cost reduction and enhanced performance presents a solid business case for deploying CTI.

Recent data on CTI and the call center industry reveals a declining cost of ownership from mediating data and telephony resources. The combination of necessary firmware and incremental expenses reflect a spatially distributed cost across the total user population—inducing an economy of scale—leaving the final figures to be divisible by a minimized maintenance value.

Utilizing LAN resources—and the resulting savings benefit—contributes to a worthwhile expansion of bandwidth in networks that host CTI traffic. While many networks have migrated to digital, analysts remain skeptical about the impact of integrated services digital network (ISDN) on the small office environment, because of its relatively expensive cost to deploy.

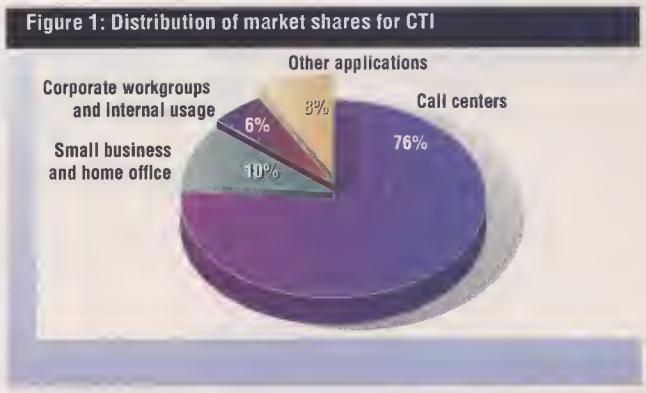
THE OUTLOOK

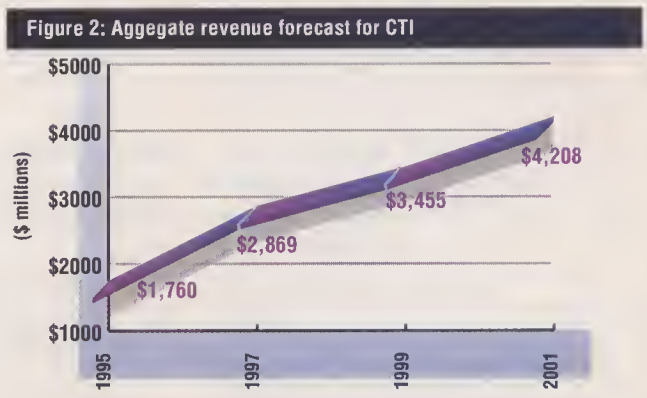
Extensive research into supplier velocity and customer models allows us to validate several assumptions.

Considering the broad nature of available solutions, data indicates a growing consumption propensity among small business and home office users as they migrate toward advanced voice processing and Internet communications (Figure 1). Further demand for groupware messaging and corporate telecommuting programs will add to a short-run expansion of users in remote computing environments.

Although call center applications should climb steadily during the next five years, the aggregate forecast for CTI revenues will nearly double in volume to slightly more than $4.2 billion over the next four years, and continue to increase as a result of concentration stemming from IVR applications (Figure 2). Customer retention and quality assurance initiatives will rely heavily on voice processing and advanced information systems to disseminate data and manage high-volume audiences.

The healthcare industry will witness a strong surge in CTI applications as medical and patient data begins to assume a centralized point of contact. Given the format of associated media (imaging, text, voice annotation), data and voice synthesis allows patient care to achieve another level of life-saving capability. Customer billing and insurance claim-processing must improve operational support as well.





CTI technologies persist to mature in the public network, providing a market opportunity for carriers to position CTI services within their portfolio of applications and service offerings. Subscribers will benefit from those carriers which tailor service levels to aide their attainment of integration goals. When all is finished, the provider with total network integration services and cost scalability wins the customer.

Tomorrow's user environment will demonstrate an elevated demand for a technology platform that joins telephony and data to improve operational efficiency and raise the functional level of each desktop unit. Mounting pressure to share traffic over a homogenous network provides a feasible perspective for deploying such network technologies as asynchronous transfer mode (ATM) to handle adequate bandwidth and capacity issues at the local and wide area network levels.

What about the telephone? Already, integrated network solutions and the power of PC technology deliver basic telephony functions to the computer. Manufacturers have recognized that internal modems and sound accessories (external speakers, microphones, etc.) rank high in consumer preference.

Integration is paramount to crossing the chasm of information technology and telephony. ■

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SHIRA LEVINE

Baby-steps to TMN

Carriers finally begin walking the standards walk—albeit slowly.

A CONSUMER WANTS TO ORDER MULTIPLE SERVICES FROM A SINGLE CARRIER—PERHAPS ADD A WIRELESS SERVICE TO HIS LOCAL SERVICE AND, WHILE HE'S AT IT, THROW IN SOME CABLE TV (CATV) OR DIAL-UP INTERNET ACCESS. ALL ON ONE BILL, PLEASE.

IT'S A PERFECTLY REASONABLE REQUEST. IN FACT, DESPITE PREDICTIONS OF STICKER-SHOCK, CARRIERS ARE BETTING THAT CONSUMERS ARE GOING TO WANT A SINGLE BILL FOR ALL OF THEIR SERVICES. THAT'S WHERE THE NIGHTMARE BEGINS.

With separate operations support systems (OSSs) for each service—one for wireless billing and an entirely different one for wireline billing, for example—a simple request such as integrated billing could require carriers to scramble to pull together disparate billing systems.

"In the past, there has not been a nice, clear separation between systems, such as the network management system and the service management system," says Shaygan Kheradpir, assistant vice president for systems architecture and planning at GTE (Stamford, Conn.) "The systems tended to be stove-piped by lines of business, which makes it very difficult to integrate services."

Nor is integrated billing the only problem. New rules and market conditions mean that carriers need to open up all of their OSSs to competition, introduce new services quickly, customize services for valuable customers and much, much more—not an easy proposition, given their traditionally inflexible legacy systems.

But for GTE and other carriers, there is a light at the end of the tunnel. The telecommunications management network (TMN) standard—the pyramid-shaped model for centralized systems and operations management—is being touted by network management gurus as the solution for everything from bundling services efficiently, to complying with federally mandated interconnection, to curing the common cold.

MCI: CUTTING COSTS WITH AUTOMATION

Some carriers are actually heeding the TMN call to action. In late 1997, MCI unveiled its TMN-based network management platform, dubbed the Integrated Management Platform for Advanced Communications Technologies (IMPACT). One of the primary drivers behind moving to a TMN-based platform was cost containment, according to Joshua Morris, director of network systems development for MCI (Washington). MCI expects IMPACT will help the company reduce the cost of monitoring its network by at least $5 million over the next four years.

"Imagine what it takes to manage a diverse network of multivendor technologies, each one architected differently, each one reporting faults and performance and other information in very different formats," Morris says. "The operational support systems that interface with all those technologies have to interpret each one, which means that the network operators need to be trained in those technologies."

By implementing a standards-based approach like TMN, however, carriers drive vendor conformance to those standards; this allows the network operations staff to manage the entire network rather than specific network technologies. In addition, standardization enables more manual processes to be automated, allowing MCI to grow its network without increasing its operations force as well—a valuable trick as MCI enters local service markets, according to Morris.

"If you look at the competitive environment today, one of the major costs is the operational cost of running the network," Morris says. "That's why our focus is to manage these costs as efficiently as possible, so we can be competitive in the pricing of our service offerings."

Improving network reliability is another way to differentiate service,

Improving network reliability is another way to differentiate service, and TMN is enabling MCI to do that as well by automating fault management capabilities.

and TMN is enabling MCI to do that as well by automating fault management capabilities. "The standards-based approach enables us to take much of the guesswork out of what the network reports to us," Morris says. "In the old paradigms, alarms came directly from the equipment, and we were left to interpret them. With TMN, intelligent information comes from the equipment, so we can much more quickly hone in on what the problem is, and respond to it or deal with it before it reaches the customer."

MCI has divided its network into three sections (or subnetworks) and is implementing the IMPACT platform in three phases along those lines. The first subnetwork to move onto the TMN platform was the synchronous optical network (Sonet) transport layer, which will be followed over the next few years by the switching and intelligent network layer and the data networking layer.

"We thought about taking a Big Bang approach to this and doing it all at once, but really what we're focused on is improving our customer service and improving our operations," Morris says. "We're going for the biggest benefits in a very controlled migration strategy that protects our legacy investment."

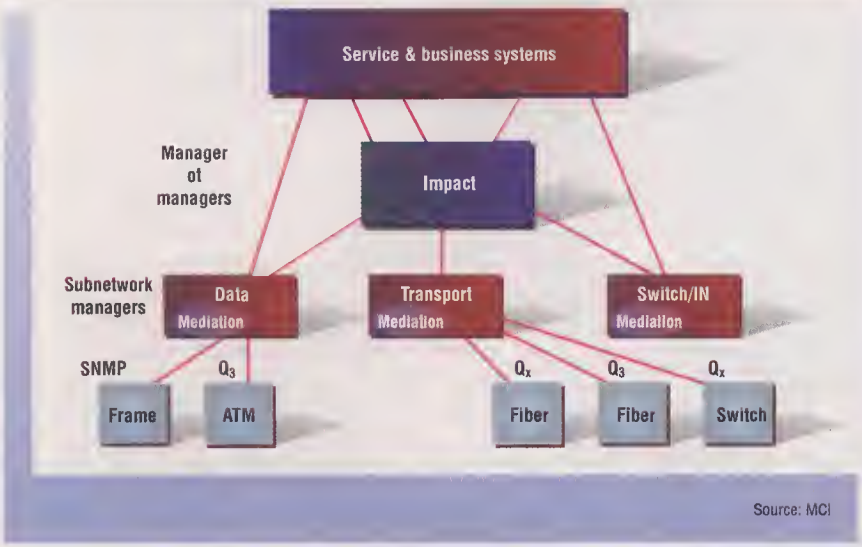
GTE: PLACING ITS BETS ON TMN AND INTERNET

GTE is taking a similar, incremental approach in deploying its TMN platform. The carrier began putting the element and network management layers of the TMN framework into place 18 months ago, and is now working on implementing the service and business management layers. The end goal is to transfer GTE's entire network operations to the TMN platform by 2000, GTE's Kheradpir says.

For GTE, the biggest driver in adopting TMN has been the speed and flexibility that standards can provide, particularly in the services-management arena. GTE is particularly bullish on incorporating the Internet into its services processes, and has developed its GTE Integrated Systems Plan (GISP) to apply Internet components to the TMN model.

"TMN and the Internet are the two major enablers for what we want to do," Kheradpir says. "We think that with this structure, combining the two, we will be able to deliver capabilities that make

Figure 1: MCI's TMN-based platform



One plus one equals ???

How mergers affect network management strategies.

MCI is steaming full-speed ahead with its Telecommunications Management Network (TMN) initiative, but will its merger with WorldCom derail the process? MCI's Morris says the two companies will discuss the best approach to network management over the next several months.

Perhaps MCI can look to the techniques implemented by older "couples." In their respective marriages, Bell Atlantic/Nynex and SBC Communications/Pacific Telesis have dealt with the issue of network management in the context of best practices.

"During the period between the handshake and the regulatory approval, there was an investigation as to what each side did and whose was best," says a spokesman for Bell Atlantic (New York). "They did 'paired comparisons,' in which they define the ideal for how a given process or program or technology should perform, then discuss how each side [compares] to the other and which one did it better. In that analysis, ideally, they reached the conclusion as to which platforms and systems prophesied best for the company as a whole going forward."

It's a step-by-step, system-by-system process that's still underway, the Bell Atlantic spokesman adds. In some cases, the Nynex approach was adopted, in others the Bell Atlantic solution was used. In other instances, an entirely new approach was taken.

SBC (San Antonio) is taking a similar "best practices" approach, says a company spokeswoman. One change made since the SBC/PacTel merger is that the combined company now manages its network on a regional basis, with area network managers reporting to a centralized network management group. All other discussions of changes in network management are ongoing, she says.

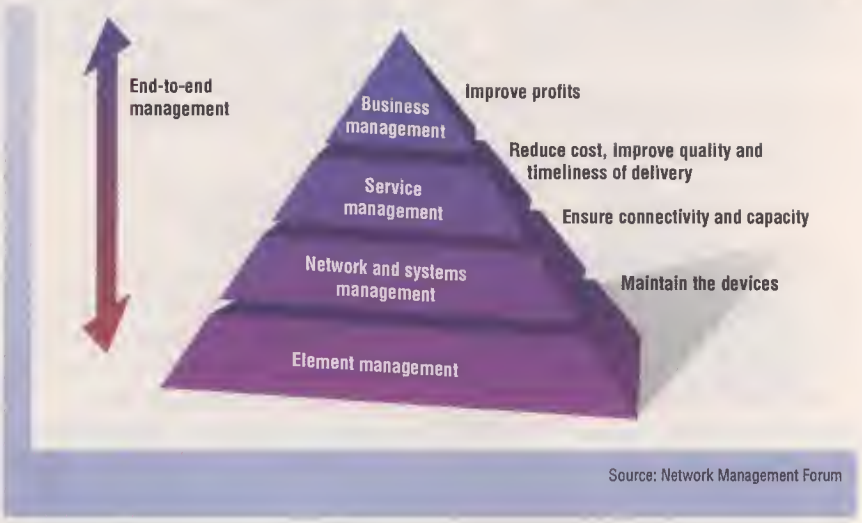
Market and regulatory conditions also are driving carriers toward adopting TMN.

our customers' lives a lot easier."

Those capabilities include allowing customers to use the Internet to find out information about services, put together and order their own customized service bundles, check pricing and even activate some of the services—all online, without interacting with a live customer service representative. By using object-oriented Internet tools such as Java Beans to create these online applications and TMN to streamline the processes on the network side, GTE hopes to make its services more customer-friendly.

"We want to be more efficient, to be able to bundle services naturally and externalize our internal processes, such as ordering and provisioning, for our customers, suppliers and partners," Kheradpir says. "For a large infrastructure like GTE, where we have many, many systems—many of them galactic-sized—TMN and Internet technologies are exactly the right combination."

Figure 2: Managing between layers



Source: Network Management Forum

SLOW PROGRESS TOWARD STANDARDS

But while GTE and MCI are well on their way to implementing solid TMN platforms, they are definitely in the minority.

"Carriers are all giving lip service to the concept of TMN, but I don't even see them taking advantage of the network management capabilities they have existing within their equipment already, let alone taking on TMN," says Dan Taylor, director of global telecom research at the Aberdeen Group (Boston). "They haven't adopted TMN at the rate I was expecting to see."

Taylor attributes the slowdown to the fact that most carriers have multiple vendors' equipment in their networks, making standardization difficult. However, an executive at one of the suppliers for MCI's TMN initiative believes that's going to change in the near future. Vendors are moving away from proprietary network management systems for their equipment toward a standards-based approach, pushing carriers toward standardizing their networks, says Mike Rieger, solutions executive for network management at IBM Telecommunications and Media Industries (White Plains, N.Y.).

Market and regulatory conditions also are driving carriers toward adopting TMN. The interconnection requirements mandated by the Telecommunications Act of 1996 and the Federal Communications Commission all can be done without TMN, but TMN can make carriers' jobs much easier. "Things like local number portability, unbundling of local networks, local access—they're all forcing a significant increase of interoperability between incumbent service providers, new carriers and resellers. And TMN is emerging as one of the standards that is resolving these interoperability issues," Rieger says.

Rieger and Taylor expect carriers to continue baby-stepping toward TMN, gradually adopting gateways to hook their legacy systems into more standards-based management systems. Taylor calls it the "Trojan horse approach," first installing TL1 adapters to manage their legacy equipment with a TMN infrastructure and moving forward from there.

"It's a monumental challenge, as if someone makes Mount Everest the first mountain they try to climb," he says. "That's the scope of the challenge, but if they break it up into smaller peaks to climb, it's much more doable." ■

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KUMAR SHAH

Implementing managed network services

Guidelines to help carriers develop comprehensive, customized service offerings.

MANAGED NETWORK SERVICES LET CARRIERS PROVIDE ADDED VALUE LAYERED ON TOP OF TRANSPORT-BASED SERVICE OFFERINGS, MAKING IT EASIER FOR END USERS TO DESIGN, IMPLEMENT, MAINTAIN AND MANAGE COMMUNICATIONS NETWORKS, BECAUSE THE CARRIER ASSUMES SOME OR ALL OF THESE FUNCTIONS. MANAGED NETWORK SERVICE IMPLEMENTATION WILL BE INFLUENCED BY A COMPANY'S BUSINESS, SALES AND FINANCIAL OBJECTIVES.

Managed network services are solutions-oriented products enabling local area network (LAN) and/or wide area network (WAN) communications. These services relieve the users of having to piece together the solutions themselves. Customers can rely on carriers to implement, maintain and manage the entire solution, which can include transport facilities, equipment and ongoing support. Services are transported over a highly reliable, scalable and flexible, packet-based network.

Developing a managed network service is all about packaging. Although service providers may have the same capabilities, creative packaging can prove to be the big differentiator.

Businesses may want to create a product description for a family of managed network services with package options designed to meet the needs of different businesses, locations or applications. Tailored services for vertical markets and industries can vary the levels of in-house expertise required at the customer locations for LAN, systems network architecture (SNA) or even voice applications. Market segmentation analysis and customer interviews should be conducted to define individual components needed for each package option. Core consistencies and constraints illustrated by the analysis will influence service comprehensiveness and sophistication. Companies always can start with a fairly basic service and enhance the service later.

The most basic managed network service includes transport and the customer premises equipment (CPE). It may be necessary to market their packages' components, depending on the target market and its familiarity with telecommunications technologies. For example, for businesses without internal management of information systems (MIS) departments, it's best to make the components transparent, and market the business benefits and applications of the service. On the other hand, a company with technical expertise may want to know about the different pieces of the package before it decides to subscribe to a single-vendor solution.

CUSTOMER PROFILE

Service providers should outline the characteristics of their target market to help identify and pre-qualify potential customers. In addition to describing the type of networks best-suited for the service, it is important to profile the customer's business environment, hot buttons, fears and limitations—managed network services are developed primarily around the latter parameters. This allows a carrier's sales department to play off the strengths of the service to address the fears of the customer.

Examples of prospect profiles that are not network-specific characteristics include:

cally are located, while remote sites

optional, depending on a particular

APPLICATIONS

Describe the types of applications that can be supported or enabled by the service. If the service is defined for LAN applications, it may be necessary to specify examples of different LAN applications, particularly if your target market is not telecom-savvy—these end users may not understand LANs and WANs, but they understand e-mail, file sharing and file transfers.

On the other hand, if a service is designed for technical users, supported LAN protocols (Internet protocol, IPX, AppleTalk, etc.) would be useful. Some applications that can be supported with an SNA-based service include order entry, inventory, payroll, accounting and other mainframe-resident functions. A service also can be designed for specific SNA network processes, such as disaster recovery, data vaulting and database mirroring.

One of the biggest advantages of packet-based networks is their ability to integrate multiple applications onto a single network, efficiently and cost-effectively. A good prospect might be one that manages separate, parallel networks for different applications. A

Table 1: Managed network services features and benefits

FEATURE	BENEFIT
Automatic network re-routing	Improves network availability.
Software-defined network connections	Offers a highly flexible network that can be modified easily and quickly.
Carrier-managed routing, policy and quality of service administration	Frees up end user to concentrate on its core business, rather than managing the moves, adds and changes for its virtual private network.
Single point of contact for all networking problems	Eliminates the need to coordinate among multiple vendors. Provides unlimited access to networking experts.
Single invoice for all service components	Improves account-reconciliation process.
Multiprotocol support	Integrates all applications onto a single network.

Table 2: Platform features and capabilities for managed network services

- Supports integration of multiple protocols. Depending on the service, this may mean support for different LAN protocols or the integration of LAN, SNA and voice applications.
- CPE has multiple interface (LAN and WAN) options.
- Can support enhanced features, such as switched virtual circuits, quality of service, security, compression and others without major hardware and/or software upgrades.
- Can support application-specific features such as local termination polling for SNA, silence suppression and compression for voice, and security for LAN applications.
- CPE can be managed remotely, in-band and out-of-band.
- CPE can respond appropriately to congestion messages received from the network.
- Software upgrades/reconfigurations can be established remotely.
- The network management system allows carriers to manage each individual customer's virtual private network.

OFFERINGS, MAKING IT EASIER FOR END USERS TO DESIGN, IMPLEMENT, MAINTAIN AND MANAGE COMMUNICATIONS NETWORKS, BECAUSE THE CARRIER ASSUMES SOME OR ALL OF THESE FUNCTIONS. MANAGED NETWORK SERVICE IMPLEMENTATION WILL BE INFLUENCED BY A COMPANY'S BUSINESS, SALES AND FINANCIAL OBJECTIVES.

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Examples of prospect profiles that are not network-specific characteristics include:

- Has limited or no MIS resources.
- Wants a single-vendor networking solution and a single point of contact.
- Needs help in managing its remote locations.
- Needs more resources to concentrate on core business rather than manage the network.
- The company is downsizing.
- The company is willing to outsource.

If the services are vertically targeted, industry-specific characteristics are ideal. A trained sales force will know how to pre-qualify outsourcing opportunities. The term outsourcing can be acceptable or taboo, depending on the customer. For example, when talking to an MIS director, the sales representative may have to position the managed network service as an extension of the MIS director's staff rather than as an outsourcing outfit. Outsourcing, in this scenario, may be perceived as job-threatening to the MIS director and MIS department.

APPLICATIONS

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One of the biggest advantages of packet-based networks is their ability to integrate multiple applications onto a single network, efficiently and cost-effectively. A good prospect might be one that manages separate, parallel networks for different applications. A service that offers a single-network solution for all of the customer applications (SNA, LAN and even on-net voice) would be ideal for this customer.

Ideally, the needs of a company's target market should drive the development of the service definition. The service definition should then, in turn, drive the networking platform decisions ... the platform decision should not drive the service definition.

FEATURES AND BENEFITS

An example feature of managed services might be the offering of three service levels: bronze, silver and gold, where the bronze option is the most basic, silver offers additional features and gold provides the most comprehensive set of services. End users can choose specific packages, depending on the level of service required at each location; for example, the bronze option may suffice for a headquarters side where the in-house MIS resources typically are located, while remote sites might require the more sophisticated silver option.

Typical managed network services features and benefits are provided in Table 1.

Ideally, the needs of a company's target market should drive the development of the service definition. The service definition should then, in turn, drive the networking platform decisions that will enable the desired managed network services—the platform decision should not drive the service definition.

Table 2 provides platform features and capabilities carriers should consider. Each of the capabilities can be categorized as mandatory, preferred, or optional, depending on a particular

Table 1: Managed network services features and benefits

FEATURE	BENEFIT
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Software-defined network connections	Offers a highly flexible network that can be modified easily and quickly.
Carrier-managed routing, policy and quality of service administration	Frees up end user to concentrate on its core business, rather than managing the moves, adds and changes for its virtual private network.
Single point of contact for all networking problems	Eliminates the need to coordinate among multiple vendors. Provides unlimited access to networking experts.
Single invoice for all service components	Improves account-reconciliation process.
Multiprotocol support	Integrates all applications onto a single network.

Table 2: Platform features and capabilities for managed network services

- Supports integration of multiple protocols. Depending on the service, this may mean support for different LAN protocols or the integration of LAN, SNA and voice applications.
- CPE has multiple interface (LAN and WAN) options.
- Can support enhanced features, such as switched virtual circuits, quality of service, security, compression and others without major hardware and/or software upgrades.
- Can support application-specific features such as local termination polling for SNA, silence suppression and compression for voice, and security for LAN applications.
- CPE can be managed remotely, in-band and out-of-band.
- CPE can respond appropriately to congestion messages received from the network.
- Software upgrades/reconfigurations can be established remotely.
- The network management system allows carriers to manage each individual customer's virtual private network.

service definition. This will help identify differentiators between equipment vendors during the vendor elimination/selection process.

It's important to evaluate the support services a vendor can offer in addition to the features and capabilities of the device. A vendor may offer assistance in developing the service, warehousing of CPE, CPE installation and maintenance, network management, network design and optimization, leasing, billing, and in other areas.

THE COMPONENTS

There are several components service providers can package to create managed network services options; seven main component categories prevail:

- Transport facilities—interexchange, local loop and LAN facilities (cabling, inside wiring, etc.);
- CPE—CSU/DSUs, modems, multiplexers, concentrators, routers, frame relay access devices (FRADs), switches, hubs, terminal adapters and others;
- Pre-implementation support—project engineers, planning sessions, an implementation plan and a site planning guide;
- Installation—equipment staging, equipment installation and standalone testing, CPE configuration, site connectivity test and internetworking acceptance tests;
- Maintenance—access to the network operations center (NOC), on-site equipment maintenance, ongoing software support, software and hardware upgrades;
- Management—network monitoring, performance management, fault management and configuration management; and
- Ongoing network support—performance and status reports, network design review, optimization recommendations and consulting.

For some of the above components, there can be varying degrees of support. Some examples include:

- 5x8, 5x12, or 7x24 access to the NOC;
- Two-hour, four-hour, or next day on-site maintenance;
- Daily, weekly, or monthly performance reports; and
- Hard copy or online performance reports.

There are many different ways to package managed network services. One of the most common tactics is to offer different options, depending on how far the service goes into the customer's premises.

This list simply presents organized groupings of possible service elements. The list does not show how carriers can leverage the features and capabilities of the transport facilities and CPE.

There are many different ways to package managed network services. One of the most common tactics is to offer different options, depending on how far the service goes into the customer's premises.

A company may want to have some rules regarding the mix of service options for a single customer network. Businesses may allow a network that has some bronze option locations and some silver option locations. If the gold option includes LAN and router table management, customers may not want to mix and match gold with silver or bronze options, because it is difficult to fully manage one location's router table and have little to no control of the other locations' router tables that it needs to talk to.

ORDERING PROCEDURES

This section of the product description assists sales representatives in submitting an order for managed network services. Carriers should outline the entire process for completing and submitting a new, change or disconnect order.

Provide a list of forms that need to be completed. Outline the different ways an order can be submitted: fax, e-mail, Web, online, regular mail and others. Provide the information necessary to submit an order, such as fax number, address, Web site address and access codes. Provide a contact for inquiries or questions. If price quotes from the pricing department are required, include procedures on how to obtain standard and individual case basis price quotes.

SERVICE GUARANTEES

Service guarantees are a commitment by the carrier to achieve a quantifiable level of performance. There is typically monetary reimbursement, rebate, credit, or contractual liability waiver given to the customer if the commitment is not met. Standard service guarantees are not mandatory. However, carriers are using service guarantees as service differentiators. Examples of service guarantees are:

- Service satisfaction—If the customer is not satisfied with the service within an initial period of months after the service is installed, the carrier will pay for all installation charges to switch back to the original carrier.
- Installation interval—If the service is not up and running within a specified number of working days, the carrier will waive all installation charges.
- Performance—There are different kinds of performance guarantees, including availability, data delivery rate, mean time between failures, and others. For example, if the network up time is less than a given percentage, the carrier will waive a month's recurring charges.
- Technology obsolescence—The carrier exempts the customer from any contract penalties when migrating from one technology to another (i.e., private lines to frame relay, or frame relay to asynchronous transfer mode; ATM).

Companies that take the time to follow these guidelines and work through some simple exercises should be able to migrate smoothly into a full-service, managed network service environment. ■

Kumar Shah is the senior marketing director at Hughes Network Systems (Germantown, Md.); he can be reached via e-mail at knshah@hns.com.

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Notebook

SHIRA LEVINE

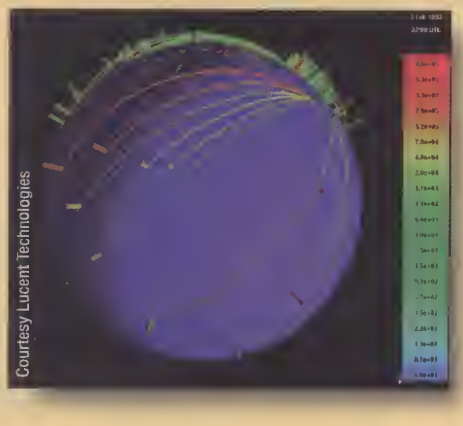
A BRIGHTER LOOK AT THE DATA

A brand-new business venture that emerged from **Lucent Technologies** (Murray Hill, N.J.) last month promises to solve everything from fraud detection to the Year 2000 problem, using data visualization technology.

Visual Insights (Naperville, Ill.) will use **Bell Labs** software to help companies analyze large databases by displaying data in an interactive, graphical format. Unlike other data analysis tools that display data in tables or graphs, Visual Insights software presents the data using shape, size, color, motion and other visual elements to represent it. As a result, huge amounts of data can be analyzed and end users can be trained to use the software in a day instead of weeks.

Visual Insights is promoting the software for use with customers' existing data analysis tools, says James Weichel, president of the venture.

"The software is really best used in conjunction with existing tools," Weichel says, citing **AT&T** as an example. Used in combination with its existing fraud-prevention system, the Visual Insights software lets the interexchange carriers monitor long-distance calls on a real-time basis, filter out any suspicious calls and drill down for more information. For example, AT&T can monitor all international calls originating from a given area code, pinpoint any that appear suspicious—perhaps a large volume of calls to different countries from a single phone number—then take a closer look to find out if there is evidence of fraud, such as a record of multiple credit cards for the calls.



Visual Insights is also marketing the software as a solution to Year 2000 problems. The product can scan through data on a company's software, identify potential problems, color-code them for severity and even drill down to the actual source code. A company's strategy for resolving its Year 2000 issues can be developed in a single eight-hour day, compared to the three weeks it would take to scan through the data manually, Weichel says.

The Visual Insights software for Year 2000 analysis is available now, while software designed for other applications will be commercially available in the first quarter of 1998.

CONXUS ROLLS OUT PCS MESSAGING SERVICE

Narrowband personal communications service provider **Conxus Communications** (Greenville, S.C.) has launched its Pocketalk voice messaging service in the Washington, D.C.-Baltimore metropolitan area, using **Glenayre's** (Charlotte, N.C.) InFLEXion voice messaging system. The Pocketalk service delivers digital voice messages in the caller's own voice and provides subscribers with guaranteed message delivery.

CBIS, PORTAL INK DEAL FOR ISP MARKET

CBIS (Cincinnati, Ohio) and **Portal Software, Inc.** (Cupertino, Calif.) have forged a strategic partnership in which both companies will offer Portal's Infranet customer management and billing software to Internet service providers (ISPs) internationally. CBIS will install, support and operate the software, freeing ISPs to concentrate on their core business.

HELPING CARRIERS KNOW THE SCORE

Wireless carriers can now assess the risk of signing up business customers, thanks to a new scoring tool developed by **Lightbridge Inc.** (Burlington, Mass.) and **Dun & Bradstreet** (Murray Hill, N.J.).

The Wireless Telecommunications Industry Score tool, which will be incorporated into Lightbridge's Telesto customer management systems starting this month, will assign a score to each potential business customer. The score will be based on information from Dun & Bradstreet's business database, including financials and payment performance, as well as information provided by the potential customer itself. The data is then run through a predictive modeler to derive a score ranging from 101 to 660, with higher numbers representing lower risk.

While there are several scoring tools available on the market for evaluating customer risk on the consumer side, this is the first product specifically targeted at the business market, says Jennifer Fellows, director of acquisition solutions at Lightbridge.

"If you try to use a consumer-based score on a business customer, the result may not really be indicative of payment history, the types of calling the business does and other recievables that it may have," Fellows says.

In addition, because business customers generally represent the highest revenues for carriers, the financial implications of delinquency are much higher than on the consumer side, she adds.

While Lightbridge is initially marketing the scoring tool to wireless carriers, it can be used by any telecom carrier, Fellows says.

In other Lightbridge news, wireless carrier **360°** (Chicago) has selected the Telesto product suite for customer profiling and screening. The carrier will use Telesto's Credit Qualification instant credit check service, InSight pre-qualification and provisioning database, Fraud Sentinel and Fraud Detect prevention and detection solutions and ProFile customer history database.

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Circle 106

CHARLES MASON

Spread spectrum to the rescue

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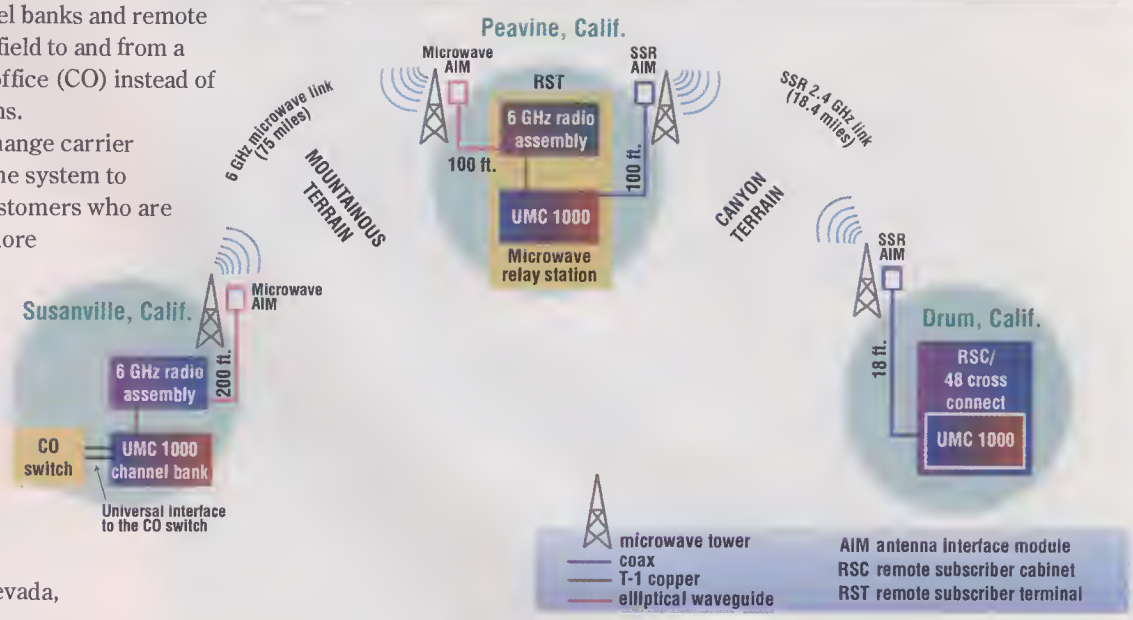
WHAT'S THE SOLUTION? DO YOU LAY 18 MILES OF EXPENSIVE, BURIED FIBER TO SERVE LESS THAN 20 CUSTOMERS?

Citizens Communications Co., a rural telephone company based in West Elk Grove, Calif., is testing an advanced wireless/wireline integration solution developed by Advanced Fibre Communications (AFC; Petaluma, Calif.). The system uses a spread spectrum radio (SSR) to transmit voice and data from channel banks and remote terminals in the field to and from a serving central office (CO) instead of wired connections.

The local exchange carrier (LEC) is using the system to serve several customers who are scattered over more than a 7-mile region. If the trial is successful, Citizens Communications plans to use the system elsewhere in its region, which stretches into Nevada, near Reno.

"We have had continual problems with theft of our open wire, which date back to World War II," says Mel Garringer, outside plant engineer for Citizens Communications. He says that the thieves apparently think the wire is solid copper and hope to sell it to scrap dealers. "When they discover that it's not solid, they just leave it there. But we're stuck with unhappy customers who no longer have phone service until we restore it."

Citizens Communications wireline-to-wireless network solution



Source: AFC

WIRELESS OVERLAY NETWORKS

Garringer, who has been spearheading the carrier's efforts, says the company had been discussing how best to improve service to the area and decided to go wireless. "The implementation of an advanced wireless solution seemed natural," he says. "Not only does it solve the theft problem, but it is cost-effective. It allows us to stop stretching the limits of our facilities. Not only do we have a quality, reliable service, but we are able to deal with capacity issues that we can't deal with today."

The company is increasingly working to serve an ever-growing customer base. "The areas outside of Reno are growing very rapidly," Garringer says.

Despite cost-effectiveness, telephone companies have often resisted replacing wireline with wireless technology.

"Telephone carriers are focused on quality," says John Webley, vice president and chief technologist at AFC. "There is a bias against radio frequency [RF]. Everyone uses cellular phones and knows the quality can be spotty."

However, Webley, one of the founding fathers of AFC, believes that this bias is changing slowly. "Once they become confident that wireless technology is very reliable, they will move to use it in many situations as a primary transport," he says.

Until that happens, Webley sees deployment of wireless solutions among landline carriers taking place primarily in overlay applications. "I think you will see wireless products being used as a backup for T1 [1.544 Mbps] services and below," he says. "The wireless backup will be there when the lines go down."

LOOK MA, NO WIRES

AFC hopes to learn a number of things from the trial with Citizens Communications, according to Webley. "Have we over-engineered the system or under-engineered it?" he says. "The impact of weather extremes that take place in the Scotts Valley region also will be interesting to watch."

The manufacturer's UMC 1000 third-generation digital loop carrier family of products has a variety of uses. The company recently agreed with 3Com Inc. (Santa Clara, Calif.) to conduct trials using the UMC 1000 to deliver asymmetrical digital subscriber line (ADSL) services. The system supports 6.2 Gbps of bandwidth and can deliver what AFC says is cost-effective xDSL service over copper, fiber, coax and radio transport media.

"Telephone carriers are focused on quality. There is a bias against radio frequency. Everyone uses cellular phones and knows the quality can be spotty."

—John Webley

The family of products is capable of supporting broadband and narrowband technologies and services, up to 155 Mbps to each subscriber. It can transition from copper to coax to synchronous optical network (Sonet) transport, and from time division multiplexing (TDM) to frame relay to asynchronous transfer mode (ATM) networks, according to AFC. The overall system serves from one to more than 2,000 lines, and is compatible with current and future public switched telephone network (PSTN) infrastructures, according to the company.

A system is comprised of two basic network elements: the local exchange terminal (LET), located in the CO, and the remote subscriber terminal (RST) located at the end of various transport media. The LET and RST are composed of identical, 26-slot channel bank assemblies (CBAs). Each CBA features integrated common control and 48 general-purpose slots. Each slot has access to the 6.2 Gbps system bandwidth.

At the heart of the new wireless-enabled UMC 1000 is an (SSR) transceiver. The transceiver is a UMC plug-in module that establishes a 30-channel wireless transport span between UMC terminals via a microwave radio antenna.

Easing regulatory headaches, UMC 1000 operates in unlicensed bands of spectrum. The system can operate in the industrial, scientific and medical (ISM) frequency band of 2.400 GHz to 2.483 GHz, as does the one being used by Citizens Telecommunications. Or it can step up to 5.7 GHz in areas requiring the higher frequency. "We have found that microwave ovens and other interference can cause us problems [at 2.4 GHz]," Webley says. "So in more developed areas, such as [in] cities, you are going to want to go to 5.7 GHz."

The SSR transceiver transmits and receives control and status information, framing and 30 64-kbps channels of voice or data originating from the channel units in the UMC 1000 subscriber slots. One SSR transceiver is required at both the local exchange terminal or remote subscriber terminals to establish a full-duplex span over a microwave radio link. The package includes a modular UMC 1000 plug-in card. An optional transverter can move the frequency from the lower band to the 5.725 GHz to 5.850 GHz band, Webley says.

The transverter module works in both directions for frequency translation. The transverter is powered from 48 volts furnished within the UMC enclosure. Received signal strength, frequency control, error rate and other information is accessible via the UMC craft interface. The UMC 1000 spread-spectrum applications support star network configurations, two or more repeaters and multiple links to a single antenna, according to AFC.

The SSR transceiver employs direct sequence spread-spectrum coding combined with a QPSK modem. Although analog-based systems have been operating successfully in rural Mexico, "the voice quality is poor," Webley says. This problem, along with

capacity issues, led AFC to seek a cost-effective digital solution.

THE INTEGRATION ISSUE

Radios that were designed for other uses, such as indoor applications, carried a lot of "baggage," according to Webley. "Some of the products out there were less expensive than microwave radios, but they were still too pricey, in the $15,000 to $20,000 range."

The challenge became taking a low-cost commercial technology and providing needed redundancy without running up the cost. The key word? Integration.

"The UMC spread spectrum transceiver is truly integrated, eliminating the need for a separate SSR shelf," Webley says. He estimates that a carrier could cover between 5 km. and 10 km. using a small antenna. "This setup is ideal where no outside plant exists or where a carrier wants to deploy an overlay."

The SSR is a plug-in unit that may be inserted into any UMC CBA multipurpose slots along with all other UMC 1000 transceivers and service channel units (CSUs). Two spread-spectrum transceiver cards are required; one at each end of the spread spectrum.

"Time is critical, and you can deploy a wireless solution immediately," Webley says. The thought of putting a receiver on a building and dropping a T1 can be inviting. "It allows you to put your toe in the water and see how much business you draw before moving toward a more permanent infrastructure commitment," he notes.

In addition, personal communications services (PCS) providers and cellular carriers can use the system in the 5.7 GHz band as backup to certain landline facilities. Webley believes wireless and wireline integration of this type will become a major factor, starting this year. "There is no reason the two shouldn't coexist quite nicely," he says. "Among other things, wireless solutions allow a low-risk ability to test a market. In this increasingly competitive environment, that could prove invaluable.

Lucent and US West bring integration to life

Wireless carriers face a major issue: the integration of their services with the mainstay of telecommunications, the wireline network.

While wireless has grown exponentially, virtually all North American wireless customers also still rely on wireline services. More often than not, they have at least one wireline number and also subscribe to an accompanying voice mail service. The number of wireless users who subscribe to voice mail service also has been growing. In fact, it has sharply accelerated due to the increasing number of wireless carriers, especially among personal communications services (PCS) providers, many of which are offering voice mail for free.

One of the oft-cited solutions of multiple landline and wireless numbers has been one-number services. However, those services have failed to fully catch fire. Some analysts maintain that one of the reasons is the lack of a simple interface. The Yankee Group (Boston, Mass.) issued a report last year that pointed to the often less-than-simple user interfaces. This issue, along with others, has stifled the business.

While falling short of being a true one-number service, last month US West began offering the nation's first consolidated wireline and wireless voice mailbox service to its Denver customers. The new service, Access2 voice Messaging Link mailbox service, lets customers use the same voice mailbox to store messages from both their home or office phones and their wireless phones.

Peter Mannetti, vice president and general manager, US West Wireless, said the move is key to "putting simplicity back into the communications experience."

An important portent

Wireline carriers also face integration issues.

A look at what is happening in Europe could very likely be an omen for the U.S. market. The Yankee Group's EuroTAF (Technologically Advanced Family) consumer survey of 1,800 households in France, Germany and the United Kingdom, released this past fall, indicates that mobile subscription is still growing in its own right. But, significantly, it is also making in-roads into conventional residential wired and cordless telephone use. This substitution effect could facilitate continuing mobile penetration growth towards the high levels for conventional phones, which are found in virtually every home, the study says.

The report points out that many consumers now give out their mobile numbers as a primary means of contact and are leaving their mobile phones switched on while at home. Consumers will also make calls from their mobile phones when other family members ties up the residential line, the report says. In other cases, consumers will exploit the convenience of a mobile phone in response to some very attractive tariffing for home use—particularly during off-peak hours.

Mobile use at home as an alternative to wire-based is most dramatic in the United Kingdom, where, for example, One 2 One (London) provides users with free off-peak or weekend local calling. In the U.K., 37% of households use mobile phones at home, either occasionally or a great deal. Corresponding figures for Germany and France are 32% and 38%, respectively. With such patterns developing, analysts say that wireline and wireless carriers must move quickly to offer comprehensive solutions to their customers.

US West's Mannetti says that his company plans to expand the service into other markets. Initial markets targeted include Portland and Salem, Oregon; Vancouver, Wash.; Colorado Springs, Greeley and Fort Collins, Colo. Mannetti says, the move is a natural one, given the huge growth in both the usage of wireless telecommunications and voice mail services.

Mannetti said that customers have had to remember multiple access codes, phone numbers and other information to access multiple voice messaging systems. Under Access2, they will have to remember only one retrieval number and one password to access their wireless, home and office messages.

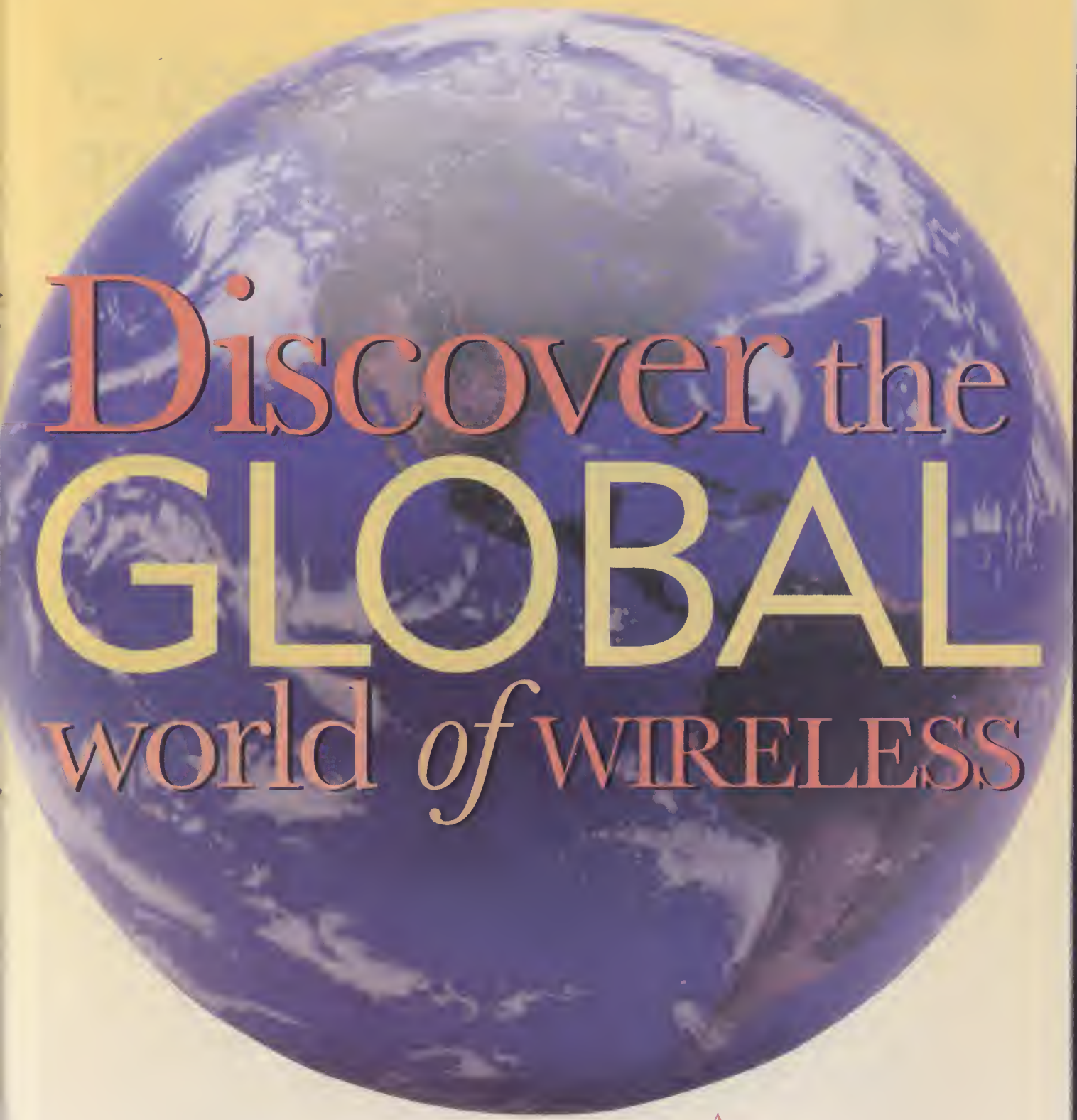
The system relies on technology from Lucent Technologies Octel Messaging Division (Milpitas, Calif.). Octel was acquired by Lucent (Murray Hill, N.J.) last September. Together the two companies extended the base of more than 200 Octel systems currently responsible for US West voice messaging service and consolidated the wireline and wireless mailboxes into one mailbox service offered on the recently launched network.

Margaret Norton, senior vice president and general manager for Lucent's Octel Messaging Division, says the move gives US West an important competitive advantage by adding adding significant value to the company's wireline and wireless services.

Lucent is offering the combined mailbox technology to other carriers who offer both wireless and wireline services in single markets, Norton says. In addition to simplifying access, both Norton and Mannetti say the service also offers automatic notification. When a call is left on the voice messaging system, the user will be immediately notified at home via a stutter dialtone and on the PCS handset via a short message service. Notification through a customer's pager will be offered as an option.

—Charles Mason

CTIA



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ALAN STEWART

The regulating of wireless local loop

Will WLL providers be seen as CLECs?

THE FEDERAL COMMUNICATIONS COMMISSION (FCC) IS GIVING LICENSE HOLDERS MORE FLEXIBILITY TO USE SPECTRUM TO PROVIDE THE SERVICES OF THEIR CHOICE, INCLUDING WIRELESS LOCAL LOOP (WLL).

Personal communications services (PCS) providers view fixed subscribers as a potentially unlimited market. Commercial mobile radio service (CMRS) is one way to connect subscribers with a minimum of regulation.

If carriers proceed with WLL implementation plans, are they considered competitive local exchange carriers (CLECs)? In a speech delivered in October at the Wireless Local Loop conference in Chicago, Jeffrey Steinberg, special counsel to the FCC's Commercial Wireless Division, took a look at the wireless CLEC issue.

The Telecommunications Act of 1996 defines CMRS as an interconnected radio service offered to the public for profit. Although CMRS implies mobility, the definition does not explicitly state that CMRS has to be mobile; the FCC has given CMRS providers flexibility to use spectrum to offer fixed services. Would such services, then, be considered CMRS? Relevant factors include what spectrum is used, and the extent to which fixed service is packaged with other offerings, Steinberg says.

CMRS providers are not regulated like LECs, although in the future the

Regulatory issues wireless carriers should consider

- INTERCONNECTION. All carriers have a general duty to interconnect with other carriers; however, incumbent local exchange carriers (ILECs) have more specific requirements which apply to both wireline and wireless networks. An ILEC must provide interconnection to any technically feasible point, and in quality at least equal to that offered by any other party, including its own subsidiary. Additionally, it must offer just, reasonable and non-discriminatory terms, including: 1) pricing based on total element long-run incremental cost (TELRIC); 2) reciprocal compensation for transport and termination; 3) broad agreements with one party made available to others similarly situated; and 4) pricing provisions which apply only to interstate services, except for some CMRS.
- UNBUNDLING. ILECs must unbundle network elements, whether in wireline or wireless networks. Competitors may purchase unbundled elements as a mode of entry; the ILEC must offer any technically feasible point under just and reasonable terms and conditions; and pricing provisions apply to interstate services in the same manner as for interconnection issues.
- RESALE. Because most competitive providers do not have physical outside plant installed, most enter the market through resale of ILEC networks. Wireless access provides a viable alternative for market entry, as ILECs must facilitate entry for wireless carriers as they do for wireline competitors. All LECs have a duty not to prohibit, unreasonably limit or condition resale; cellular-like CMRS providers are subject to similar rules.
- COLLOCATION. The FCC defines *collocation* as the physical or virtual placement of a competitor's facilities within an ILEC's switching/transmission facilities.
- NUMBER PORTABILITY. Implications of number portability for wireless carriers are significant, as the FCC has promulgated rules specifying the availability of number portability in the largest metro areas and on request in most other areas by 1999. These LNP rules apply to CMRS, with some changes.
- DIALING PARITY. The ILEC must provide non-discriminatory access to telephone numbers, operators, network services, etc. This obligation does not apply to CMRS, although providers of CMRS may benefit from these provisions. Inconsistencies with "calling party pays" arrangements for wireless have not been resolved.
- UNIVERSAL SERVICE. All interstate carriers must contribute to the Universal Service Fund, and states may require the same obligation of intrastate carriers. All carriers providing qualifying services are eligible to subsidize these services from the fund.
- ACCESS CHARGES. As the distinction between local and long distance service begins to break down, continued administration of the access charge process becomes harder to define, according to Steinberg. For example, access charges that include subsidies could disrupt the economics of the competitive market, particularly in the wireless area, he says.

FCC could decide to classify some or all CMRS providers as local carriers, Steinberg says.

This is important, he notes, because currently state and local governments are not permitted to regulate the rates or entry of CMRS providers. Under the recent 8th Circuit Court decision overturning some of the FCC's interconnection rules, the commission has greater jurisdiction over interconnection and related issues with respect to CMRS providers.

Although the Act defines a LEC as "any person that is engaged in the provision of telephone exchange services or exchange access," CMRS providers are not LECs unless the commission decides they are, according to Steinberg. Although the FCC has not addressed the issue, the definition of LEC would appear to include WLL providers unless they are CMRS.

LECs are subject to special obligations in the areas of resale, number portability, dialing parity, access to right-of-way, and reciprocal compensation. Based on this current interpretation, Steinberg says, WLL providers are not considered incumbent LECs, which are subject to additional regulatory obligations (as noted in the boxed text).

Contributing editor Alan Stewart is a freelance writer and telecommunications consultant based in Chicago.

Siting: A complex issue

Although at first glance it appears that siting of wireless facilities is a much less complex and expensive proposition than wireline, regulations are becoming more complex. Local community authority is the subject of ongoing proceedings regarding preemption of certain local moratoria on facilities siting.

Sec. 332(c)(7) of the Telecommunications Act governs facilities siting, and applies to "personal wireless services" which clearly include WLL and CMRS. The Act places limitations on the scope of local zoning authority. For example, communities cannot prohibit (effectively or otherwise) provision of services; they cannot discriminate unreasonably among functionally equivalent providers; they cannot unreasonably delay decisions on applications; and they may not make decisions on the basis of radio frequency emissions.

Although much of the new spectrum is encumbered by scattered, existing users, new licensees are ordinarily responsible for relocation.

The FCC is helping communities draft siting ordinances that protect all parties' interests, but its ability to make decisions is limited, except where RF emission issues are involved.

Notebook

CHARLES MASON

USW NEWVECTOR WILL REPLACE SEVEN-CITY INFRASTRUCTURE

US West New Vector (**AirTouch Cellular;** Bellevue, Wash.) announced last month it would replace its wireless network infrastructure in seven cities with a **Lucent Technologies** platform based on Code Division Multiple Access (CDMA) technology.

The carrier will install the CDMA networks in Albuquerque, N.M.; Boise, Idaho; Des Moines, Iowa; Duluth, Minn.; Fargo, N.D.; Omaha, Neb.; and Spokane, Wash. Commercial service is planned to be up and running in early 1998. USWNV's AirTouch operation already has CDMA networks in Portland, Ore., and Salt Lake City.

Under a five-year contract, Lucent will provide its CDMA Autoplex Series II cell site equipment and 5ESS-2000 switches, along with the company's 13 kbps voice encoder. The CDMA systems perform soft handoffs over a wide area, improving call quality as customers travel through a service area or between adjacent CDMA networks. The same platform supports digital and analog wireless services.

BELLSOUTH, SCC PROVIDE WIRELESS E-911

BellSouth (Atlanta) is amending its Enhanced 911 system to accommodate wireless users in its region.

"With our 911 enhancements, public safety answering agencies will receive a 10-digit callback number for wireless emergency calls, and be able to identify the area from which wireless 911 calls originate," says Rod Odom, president of BellSouth Business Systems.

BellSouth will use 9-1-1 Connect service from **SCC Communications Corp.** (Denver), which provides capabilities for database planning, construction, maintenance and coordination among public safety organizations and wireless carriers. The enhancements, which will be in place by April, are compatible with existing equipment installed in public safety agencies. The enhancements will be made available to all wireless companies in BellSouth's operating region.

UNIDIAL IS FIRST RESELLER TO MARKET SPRINT PCS

UniDial Communications (Louisville, Ky.) has become the first national third-party agent to sell **Sprint PCS** phones and service under the Sprint brand.

While Sprint plans to continue selling Sprint PCS through its own sales representatives, the carrier said UniDial's national network of 6,000 independent agents and representatives will enhance one-on-one sales efforts.

"With the assistance of UniDial representatives, we are now able to extend the reach of our distribution by offering enhanced convenience to buinesses coast to coast," says Matt Jones, vice president of national sales for Sprint PCS.

UniDial agents are owners/operators of their own businesses, and have unrestricted access to geographical sales territories. The reseller's product lineup includes long distance, Internet access, voice mail, paging and wireless offerings.

TELULAR LICENSES INTERFACE TECHNOLOGIES TO ERICSSON

Telular Corp. (Buffalo Grove, Ill.) has licensed its patent portfolio of wireline-to-wireless interface technologies for **Ericsson Radio Systems'** (Stockholm) rollout of fixed wireless systems.

The interface technologies automatically bridge landline services with wireless networks, carrying voice, fax, data, bypass and remote diagnostic traffic, according to Ericsson sources.

Ericsson Radio Systems will deploy the interface technology through its wireless standards (GSM 900/1800/1900, and analog NMT and TACS).

"The recent growth of WLL, wireless local loop license awards and mixed, mobile/fixed deployments reinforces the need for wireline phone services to be delivered through fixed wireless terminals," says Sandy Moore, senior vice president of strategic alliances and sales at Telular.

INTERDIGITAL PARTICIPATES IN SAMSUNG B-CDMA TRIALS

InterDigital Communications Corp. (King of Prussia, Pa.) last month signed a technology and product engineering and test site support agreement with **Samsung Electronics Co.** The $500,000 deal requires InterDigital to provide planning, field installation and equipment design services for Samsung's upcoming trials of Broadband-CDMA (B-CDMA) technology.

Samsung plans to conduct B-CDMA field trials of wireless local loop applications in several locations in Asia and Africa this year. The Korea-based company expects the world market for wireless local loop (WLL) products to reach 200 million subscribers by 2005.

InterDigital's TrueLink product offers services in a point-to-multipoint network. The company plans to commercialize the product in late 1998, according to InterDigital sources.

CALLING-PARTY-PAYS CONFERNECE SCHEDULED FOR MARCH

A conference dedicated to analyzing the cost, profitability, marketing and billing implications of implementing calling-party pays is slated for March 23–25 in San Francisco.

Speakers from **AirTouch Cellular, Western Wireless Inc., Celumovil, Movicom, Alcatel Network Systems** and **Saville Systems** will profile how to overcome implementation barriers and reach agreements with local exchange carriers on billing of incoming calls.

Representatives from the Cellular Telecommunications Industry Association and the Federal Communications Commission will provide information on revenue distribution; collection procedures; outsourcing; local exchange carrier unbundling responsibilities; national standards for notifying landline customers; SS7 and AIN call-management features; traffic patterns in areas where the application is offered; and revenue per subscriber growth rate.

For more information or to register, call the Institute for International Research at 941/951-7885 or fax 941/365-2507.

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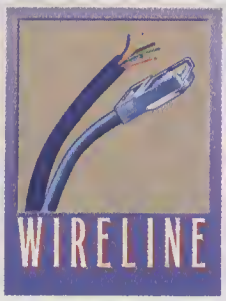


DAVID SELF AND JIM SZELIGA

Running the DSL numbers

The business case for DSL deployment says you don't have to cannibalize existing services just to get new revenue.

THE MARKETS FOR HIGH-SPEED INTERNET ACCESS AND CORPORATE LOCAL AREA NETWORK (LAN) CONNECTIVITY VIA DIGITAL SUBSCRIBER LINE (xDSL) TECHNOLOGIES OFFER OPPORTUNITIES FOR SERVICE PROVIDERS, BUT ONLY IF THE CARRIERS CAN MAKE THE BUSINESS CASE FOR THEM. THE KEY INGREDIENTS: A CLEAR DEFINITION OF WHAT A SUBSCRIBER IS WILLING TO PAY FOR A SERVICE, AND MATCHING MARKET DEMAND WITH THE RIGHT TECHNOLOGY.

What may be the most important early step is to think through the business case for providing an xDSL-based service. Getting the business planners involved as early as possible to form a model for the service puts them on par with the technical planners. That synchronization of the business and the technical foci can make the difference in whether a service succeeds or flops.

A well-thought-out xDSL business case, involving a higher-speed service offering that maximizes the Internet's available bandwidth without straining the provider's backbone, demonstrates that carriers do not have to cannibalize existing services in search of new sources of revenue. The technology offers appealing revenue opportunities in Internet and work-at-home services, without high risks.

AVOIDING THE HFC PITFALLS

Network solutions and service offerings range from Internet protocol (IP)-based schemes to "ATM to the home." Nearly all facilities-based providers are in contention for this business, including the regional Bell operating companies (RBOCs) and incumbent local exchange carriers (ILECs), competitive local exchange carriers (CLECs) and Internet service providers (ISPs).

Setting the stage for xDSL, Full Service Network (FSN) services—especially video-on-demand (VOD)—have been promoted by some as the near-term future. Promoted is the key word. After years of talk, there still is no significant deployment of FSN services by the LECs.

Hybrid fiber-coax (HFC) and fiber-to-the-curb (FTTC), once considered the dominant architectural candidates for FSN services, revealed major risks when these two approaches were scrutinized. On the revenue side, there were risks with customers' willingness to pay for a single, comprehensive set of advanced services for telephony, digital broadcast video, digital VOD and Internet access. On the cost side, there was even more risk, mainly due to the large capital investments required by carriers for new access technologies and backbone infrastructures. The combination of unsure market demand and large capital investments pushed this broadband paradigm shift too far into the future to be practical.

However, xDSL presents a business scenario that avoids the difficulties of the HFC experience. First, xDSL focuses on recognized markets—Internet access and remote corporate LAN access. Second, because xDSL is an overlay technology, it requires small, incremental investments that can be strategically deployed on-demand. This greatly reduces the risk associated with large capital investments. The xDSL business case, especially at moderate access speeds, illustrates a profitable service under today's LEC infrastructure—one that promises a migration path to the FSN of the future. The challenge is to satisfy today's practical applications while preparing for the next market environment.

The direct relationship between bandwidth and cost (as bandwidth increases, so does cost) is not likely to change in the near future. Most carriers and ISPs that lease bandwidth do so by contracting for the smallest bundle necessary to cover traffic and quality of service. So, how can affordable, multi-megabit services be offered to residential or small office-home office (SOHO) customers?

ISPs need a certain number of subscribers to cover the recurring cost of leased-port connections that connect their networks to the Internet backbone. For example, at a leased cost of $2,000 per month for a T1 port connection, an ISP will require different revenues per subscriber if 10, 100 or 2,000 subscribers share the single T1. While fewer subscribers sharing bandwidth

may increase bandwidth to individual subscribers, it also increases the revenue requirements per subscriber.

Internet access and remote corporate LAN access services can be provided with a real increase in bandwidth—such as 384 kbps—offering subscribers a significant boost in performance while simultaneously minimizing the ripple effect on access costs, computing resources and backbone costs. It boldly establishes a consumer-oriented price threshold at $60 or less per month, with a one-time cost at $225 for the initial cost of modems and installation.

THE BUSINESS CASE

Today's network topology has inherent limitations, due to the properties of transmission control protocol/Internet protocol (TCP/IP), delays through routers, packet congestion and packet loss, and use of servers and personal computers. Various tests have pegged the peak Internet throughput at 300 kbps to 400 kbps without any limitations from access links .

Users whose access is via 33.6 kbps modems would use only 10% of peak available bandwidth. An integrated services digital network (ISDN) connection (128 kbps) would use about a third of available peak bandwidth. Access at 384 kbps would use the full Internet throughput, while access at speeds beyond 400 kbps would have no significant added benefits.

Consider, also, a business office with a T1 interface serving 100 to 400 subscribers. These users are typically connected to a LAN at 10 Mbps. Compared with that scenario, a service offering of 384 kbps, concentrated at 100:1 into a T1, would provide a considerable improvement in perceived performance for xDSL subscribers.

The first step is to establish a set of revenue benchmarks for a service offering. Residential Internet access and remote LAN access are well-established markets, and both offer a good starting point for analysis. Typical subscriber one-time and recurring costs are shown in Table 1.

With xDSL, providers have an enhanced service with two major advantages:

- It gives users high-speed access; and
- It provides instantaneous connectivity, similar to what users have become accustomed to in work environments.

Today's network topology has inherent limitations, due to the properties of TCP/IP, delays through routers, packet congestion and packet loss, and use of servers and PCs.

The business case network model (see Figure 1, page 36) includes xDSL access equipment, transport and port connections to the Internet backbone. For this business case, we chose a model network of 21 offices serving 2,600 subscribers, set up as follows:

- One main office serving 1,000 users;
- Five second-tier offices serving 245 subscribers each; and
- 15 third-tier offices serving 25 subscribers each.

The objective of a business case for this network is to estimate revenue, investments, operating cost, general administration cost and taxes (see Table 2). The network is expected to generate revenue for the life of the product. Deducted from the revenue stream are depreciation, operating cost, general administration cost and taxes. To judge the model, the cash flow is calculated by adding back the depreciation to the income (net). The high operating cost in the first year results in a negative income before tax and a negative tax. This tax is treated as a credit to this project, because it is a real cash opportunity. The result is a cash flow judged two ways:

- The Net Present Value (NPV) is today's value of the series of resultant cash flows (not the investment) at an interest rate of 10%. If the NPV is higher than the investment, the project is judged acceptable.
- The Internal Rate of Return (IRR) is the interest rate received for an investment (a negative value) and income (resultant net cash flow) that occurred over the period. The IRR is generally preferred, since it includes an analysis of the investment and resultant cash flow over the period.

Included in the model are variables such as:

- Investment—xDSL equipment, backbone equipment, network management, spares, central office installation

Table 1: Subscriber one-time and recurring costs

Access technology	Modem cost	Monthly rate	Second line
33.6 modem	$125	$20	$20
ISDN service	$225	$80	included
Cable Internet (one-way)	$225	$35	$20
Cable Internet (two-way)	$250	$45	n/a

Table 2: Example of financial business case (per subscriber)

	Startup	Year 1 ($)	Year 2 ($)	Year 3 ($)	Year 4 ($)	Year 5 ($)
Revenue for circuit per year		643	643	643	643	643
Revenue for installation	+	225				
Total revenue	–	868	643	643	643	643
Depreciation	–	99	99	99	99	99
Total operating cost	–	881	240	240	240	240
G&A	–	91	67	67	67	67
Income before tax		–203	237	237	237	237
Taxes	–	–85	100	100	100	100
Net income		–118	137	137	137	137
Cash flow	–492	–19	236	236	236	236

Notes:

Total investment	$492
Net present value (@10%)	$664
Internal rate of return	20%
Revenue for circuit/month	$53.58

Figure 1: Model network of 21 serving offices

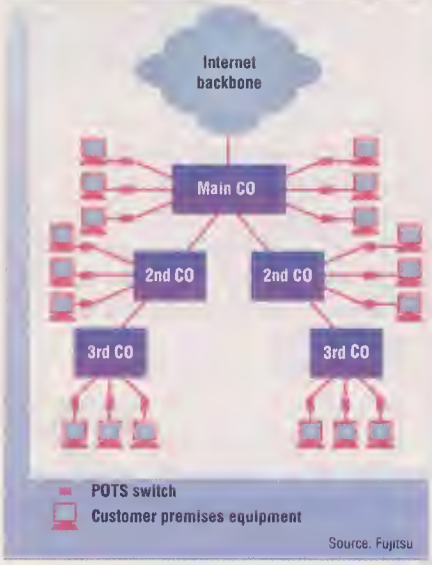
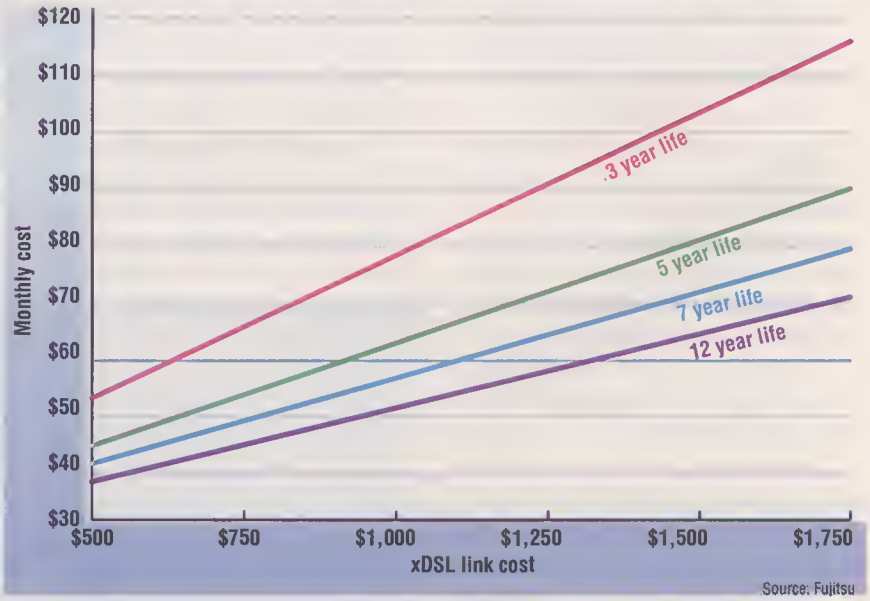


Figure 2: Monthly rate for Internet access vs. xDSL link cost

Figure 3: xDSL link investment for different life cycles



and one-time training cost;
- Depreciation of investment;
- Operating cost—billing, installation and engineering for subscriber, direct sales cost, total backbone recurring costs, maintenance, incremental and other equipment cost allocations; and
- General administration—marketing and selling costs, advertising, plant administration and other costs.

With so many variables making up the full financial model, let's focus on the sensitivities of the business case that represent some of the important variables influencing the monthly rate charged to subscribers:
- Cost of the xDSL equipment;
- Life of the xDSL equipment;
- Cost of backbone facilities;
- Cost of customer support; and
- Concentration of subscribers on backbone facilities.

Figure 2 illustrates the sensitivity of the monthly rate to xDSL equipment cost. The monthly rate is adjusted to maintain a constant 20% internal rate of return.

The total xDSL link cost includes central office (CO) and customer equipment, with the cost split evenly between the two. At the CO are Fujitsu's Speedport DSL access multiplexer (DSLAM) shelf, DSLAM concentrator cards, plain old telephone service (POTS) splitter and modems. The subscriber equipment includes the POTS splitter and modem. The model treats the CO equipment as an investment depreciated over the life of the product. The subscriber equipment is expenses in the first year.

From Figure 3, we see that a monthly rate of $60 can be achieved with products ranging from $700 to $1,300. The product cost difference depends on life expectancy.

For all of the above cost points, we assume the subscriber pays a one-time fee of $225 for the modem, POTS splitter and installation. The link cost is the average cost per link over a network, not the link cost of a fully loaded shelf. Generally, we provide realistic topologies without fully loading all shelves. xDSL equipment has matured over the past two years, and prices that were more than $1,500 per link last year are now approaching $750.

More critical to the equipment cost is

per T1, with T3 cost estimated at equal to eight times this ($16,000 per month). The transmission facilities cost is figured at $250 per month, with T3 also estimated at equal to eight times this ($2,000 per month).

These rates reflect prevailing rates for bandwidth in areas that are connected via competitive fiber networks. If the bandwidth requirement exceeds eight T1s, then a T3 is used. For the models in Figure 1, one T3 connects the main CO to the Internet port, three T1s are used between the second-tier office and the main office, with one T1 connecting the third-tier offices to the main office.

The cost associated with providing telephone support for this service is one of the most difficult to address. Figure 5 illustrates the sensitivity to the number of non-reimbursed service calls; these are the number of times a customer needs assistance over one year. In most examples, 80% to 90% of these calls are not associated with a network problem but rather to help customers resolve PC operating system problems. If a carrier could impose a rule that all non-network troubles are billed to the subscriber, then a rate can be analyzed in which just two or three

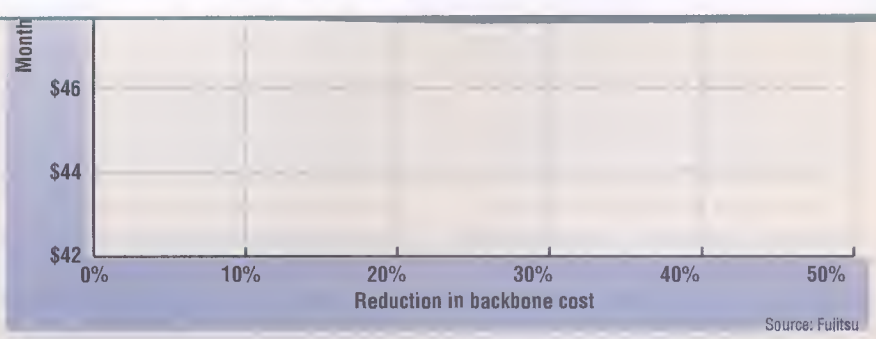
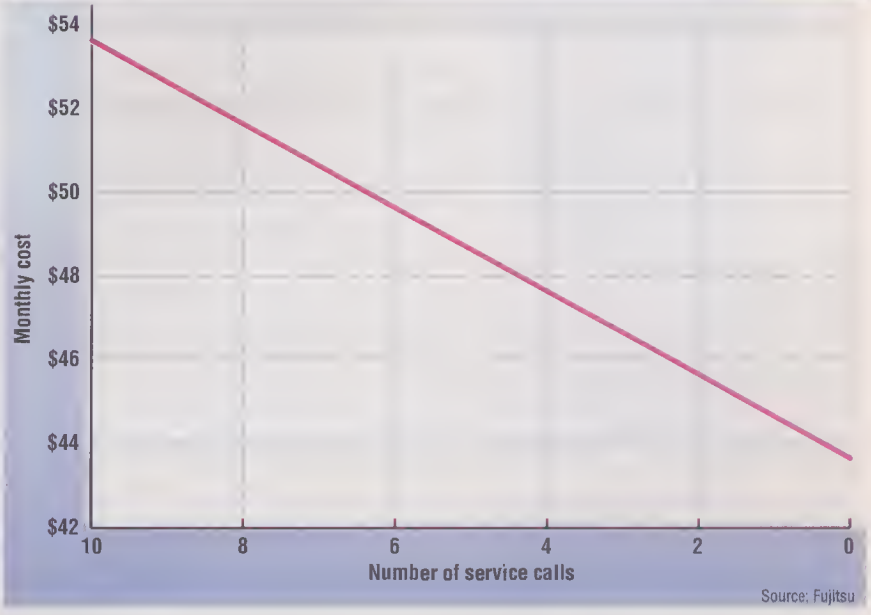


Figure 5: Number of telephone support service calls per year per customer



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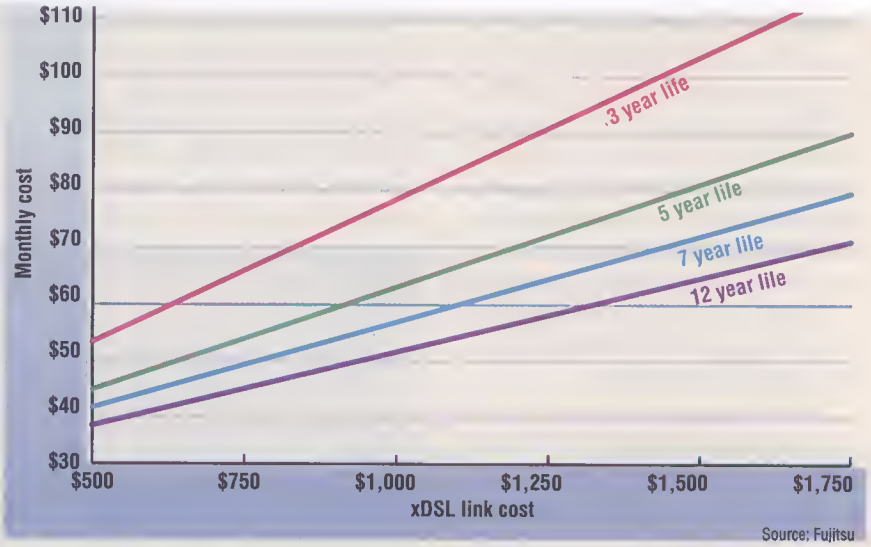

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More critical to the equipment cost is

the expected revenue life. From Figure 3, we see that a monthly rate of $60 can be achieved with products ranging from $700 to $1,300. The product cost difference depends on life expectancy; a product with a longer life is better, since it is designed to adapt to network changes for higher-speed applications as they are available.

Two important costs are backbone recurring cost and customer telephone support. Figure 4 shows the effect of reducing the cost of backbone facilities up to 50%. This discount can represent the difference between a carrier that leases facilities and one that uses its own facilities.

The backbone cost is based on Internet port connections and T1 and T3 transmission facilities between the main office and the Internet backbone, and between second- and third-tier offices and the main office. The cost for Internet port connections is pegged, for this business case, at $2,000 per month per T1, with T3 cost estimated at equal to eight times this ($16,000 per month). The transmission facilities cost is figured at $250 per month, with T3 also estimated at equal to eight times this ($2,000 per month).

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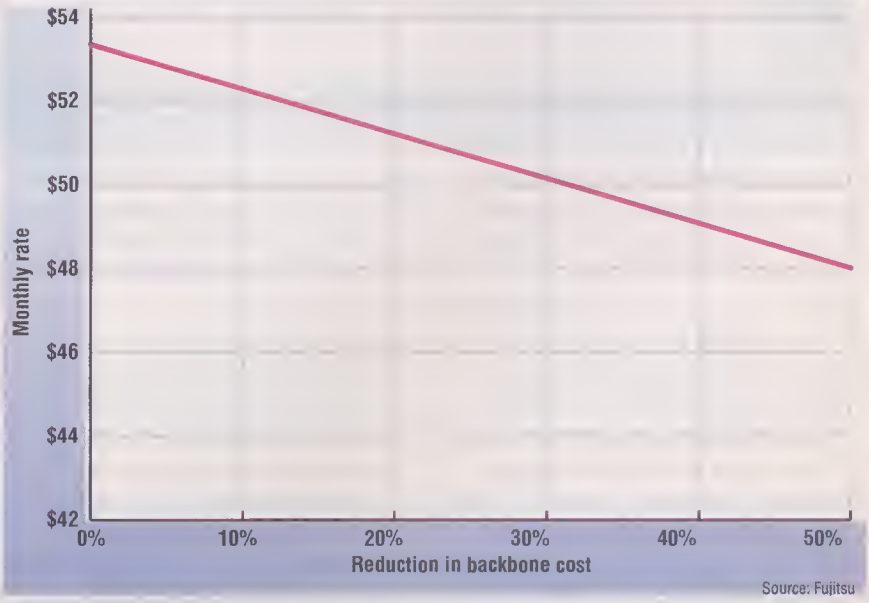
calls per year need to be associated with the network monthly service.

This remains a critical issue for xDSL service. One thought would be to add a $10 per month charge for service with an incentive to credit the subscriber's bill at the end of the year, based on the number of service calls.

Speeds of 384 kbps and 768 kbps for SDSL and up to 8 Mbps for ADSL do eliminate the negative aspects of Internet access—slow Web browsing through constrained dial-up voice grade modems over the public switched telephone network (PSTN).

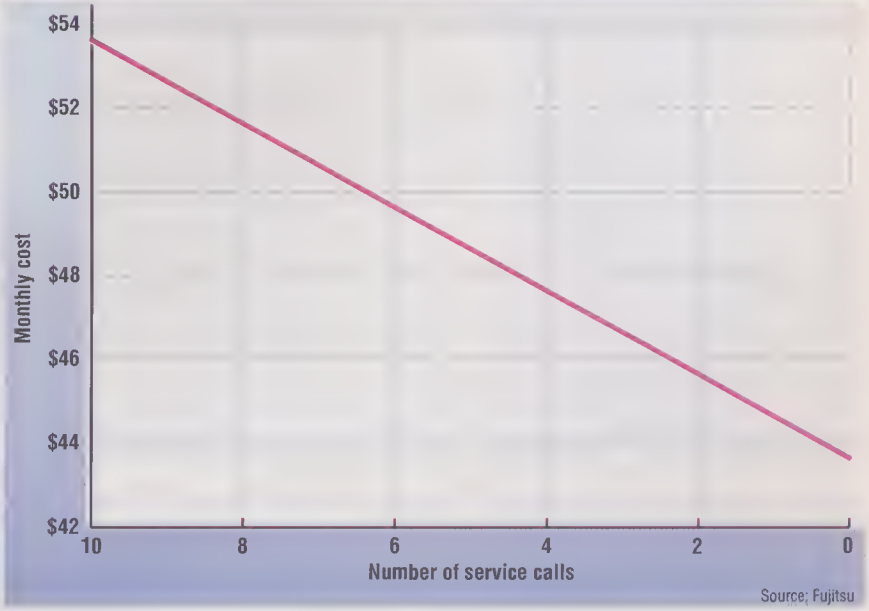
But we need to look at the issues of increasing backbone bandwidth and network switching infrastructure on a

Figure 4: Reduction in backbone facility cost



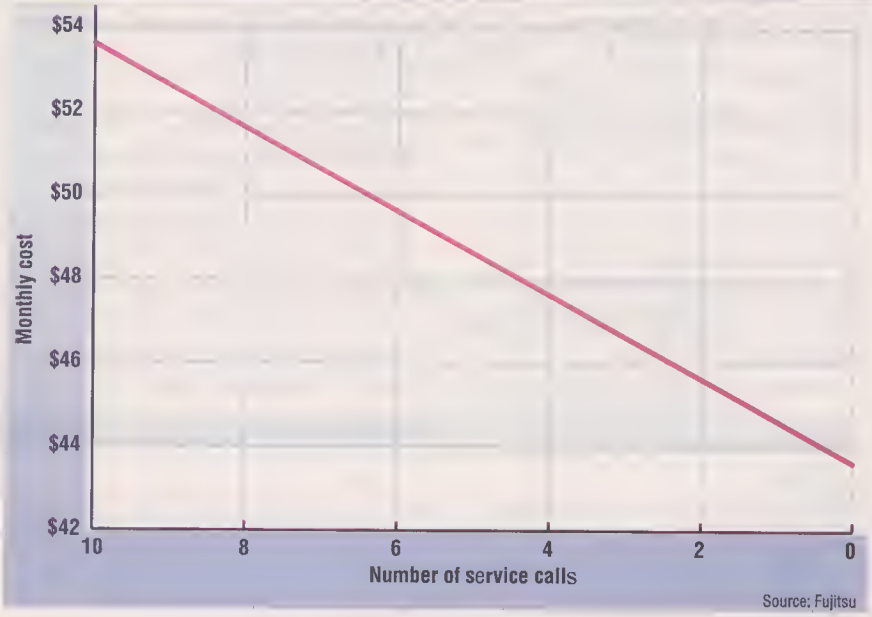
Source: Fujitsu

Figure 5: Number of telephone support service calls per year per customer



Source: Fujitsu

Figure 6: Number of subscribers concentrated on a T1



Source: Fujitsu

per-subscriber basis to support the increased subscriber demand for bandwidth. Figure 6 illustrates what happens to the business case relative to the number of subscribers that aggregate over a T1. If we assign only six subscribers per T1, the backbone bandwidth requirements explode to more than 16 T3s.

In this business case, the rates per subscriber for a low concentration of subscribers will start to approach $200 per month, which may be suitable for business applications. Some ISPs see SDSL and ADSL as an excellent way to provide business with high-speed services at rates that compete with T1 access lines. In fact, most ISPs are considering charging much higher rates than what this chart indicates.

Figure 6 has four distinct plots. The first (solid red line) assumes xDSL per-link equipment cost at $750, without any cost reduction in backbone facility cost and maintenance. The second plot

Some ISPs see SDSL and ADSL as an excellent way to provide business with high-speed services at rates that compete with T1 access lines.

(solid blue line) reduces the cost of xDSL equipment to $500 per link, a point that most vendors and carriers are aiming for. The third plot (broken red line) reduces the backbone facility and maintenance cost by half and cuts the support cost (to five calls per year), but still keeps the link cost at $750. This illustrates an advantage a dominant carrier has if it can allocate internal network facilities at half the cost of another carrier, which must build an overlay network on leased facilities. The final plot (broken blue line) combines the lower backbone facility, maintenance and xDSL per-link (at $500) equipment cost. The result: reasonable rates with excellent bandwidth. ■

David Self is director of corporate business development for Fujitsu Network Communications, Inc. (Richardson, Texas). Jim Szeliga is general manager of Israel-based Orckit Communications Inc.

DSL backgrounder

Digital subscriber line (xDSL) technology provides digital transmission over existing copper loop telephone subscriber lines. xDSL transmits and receives digital signals simultaneously with existing POTS, but in a higher-frequency band. xDSL can provide a digital channel between a subscriber and the telephone company serving point (central office, remote office or digital loop carrier location) without adding a second line or building new cable.

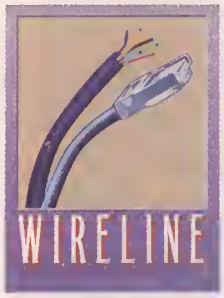
There is a family of DSL technologies. Asymmetrical DSL (ADSL) provides a channel of up to 8.2 Mbps to the subscriber and up to 768 kbps from the subscriber. Symmetrical DSL (SDSL) provides up to 768 kbps service in both directions.

Providing a digital channel to the serving point is not a service. Carriers must connect the xDSL channels to a network that provides a service for which subscribers are willing to pay.

The problems of using the existing public switched telephone network (PSTN) are threefold:

- The PSTN is inherently limited to increments of 64 kbps;
- Internet traffic is bursty and not well-suited for this network; and
- Carriers are looking for ways to relieve congestion on the PSTN switches caused by Internet traffic. Local exchange carriers are considering building new networks behind the xDSL systems.

Such a new network can be based on an Internet architecture (referred to as the Internet protocol, or IP) or on an asynchronous transfer mode (ATM) architecture. In either case, xDSL will be offered as a new type of service.



ANNIE LINDSTROM

Commercial xDSL pricing makes its debut

Some billing patterns are already emerging.

Service providers played Santa Claus to end users and digital subscriber line (xDSL) equipment vendors in the last quarter of 1997 by ushering in the first commercial asymmetrical, symmetrical and single-wire high-speed DSL (ADSL, SDSL and HDSL) offerings. In doing so, they finally revealed their initial pricing schemes to the world and in turn their thoughts on the prices they think the market will bear.

In most cases, commercial xDSL service costs business and residential users more than $30 to $50 per month. Installation charges would not best be described as insignificant.

"Overall, I think initial pricing is a little high because the service providers are cream-skimming," says Randy Carlson, senior analyst for The Yankee Group (Boston). "They are getting the customers who aren't willing to pay for a T1 [1.544 Mbps] line, but for whom ISDN doesn't provide enough bandwidth, and they are moving them up." Nevertheless, pricing varies widely. One Internet service provider (ISP), CADVision (Calgary, Alberta) has found a creative way to take the sting out of its own start up costs by charging end users for an entire year's worth of service up front.The good news for end users is that paying ahead keeps their cost down. Businesses can hook up eight computers to a 2.5 Mbps downstream/1 Mbps upstream rate-adaptive DSL (RADSL), and obtain the necessary hardware for $1,095 per year (the equivalent of $91 per month) plus a $400 installation charge, according to Geoffrey Shmigelsky, president and founder of CADVision. At press time, the ISP was preparing to unveil a 7 Mbps/1 Mbps service for $1,450 per year ($120 per month) and a $400 installation charge.

"Entire companies can run off this and pay for it out of petty cash," Shmigelsky says.

Residential users can get a 2.5 Mbps/1 Mbps RADSL for $435 per year (the equivalent of $36.25 per month) plus a $99 installation fee.

Prices could be even lower if CADVision were allowed by law to collocate its equipment in the local carrier's central offices (COs), Shmigelsky adds. To make up for that limitation, the ISP has bought homes and space next to these COs, and collocated its equipment inside them. A fiber connects the "mock COs" to CADVision's main office in downtown Calgary.

"Charging for the service up front removes a lot of the administration costs for us. It's really no problem for people to pay up front. If they can't afford that, then they need to go somewhere else for service," Shmigelsky notes.

CADVision plans to drop the cost of its residential service to as low as $20 per month within the next year once it has deployed equipment which its xDSL supplier, Paradyne (Largo, Fla.), plans to roll out later this month, he adds. Business pricing is likely to remain the same, however, as it is already "pretty fair" and "competitive.

"There is not a lot of incentive for us to lower business pricing, but there is an incentive to lower consumer pricing," Shmigelsky says. "We expect less than 1% of consumers to bite at current prices."

Chuck Haas, vice president of sales and marketing for Covad Communications Co. (Santa Clara, Calif.), believes it will take two years for pricing to drop significantly. "A $125 monthly charge is not a consumer price point; it's too expensive for that market." Haas says. "In the business space, however, we are providing T1 bandwidth at 20% of what the average T1 would cost."

BACK IN THE USA

No U.S. service provider offers commercial RADSL at the 2.5 Mbps downstream rate that CADVision offers. Most services top out at 1.5 Mbps down and range from 128 kbps to 680 kbps up. On the low end of the pricing spectrum is Chicago-based Ameritech's 1.5 Mbps/128 kbps offering, which provides end users with Internet access only and costs $150 to install and $50 per month for the service. Ameritech launched its Ameritech.net High Speed Internet Service in partnership with Microsoft in December. Interestingly, early adopters receive a discount of $10 per month for the first year of service. Ameritech plans to raise the prices of the service by $10 next year.

The high end of the pricing spectrum includes Thorn Communications Inc.'s 1.6 Mbps/680 kbps offering, which costs $600 per month plus a $750 installation fee, and GTE Communications Corp.'s ADSL OnSite1.5 Mbps/384 kbps RADSL business offering, priced at $700 per month and costs $500 to install.

No inferences should be made on long-term pricing from the prices being charged in GTE's initial market, in

Marina Del Rey, Calif., says Flynn Nogueira, director of xDSL for GTE Communications. There, the carrier is offering 680 kbps/256 kbps RADSL to residential users for $125 per month, plus a $250 installation charge.

"The whole reason for ADSL OnSite is to get into the market quickly," she says. "We have an educated customer base that knows what bandwidth is and if we don't take advantage of this now, another industry will."

Initial pricing for San Antonio-based SBC Communications' FasTrak was determined through market research and talking with customers, adds Paula Reinman, director of DSL marketing for SBC. "For high-speed data alternatives, these are excellent prices."

"The pricing you hear today will not be the final word," adds Mike Powell, marketing manager of FasTrack DSL, for SBC.

READY, AIM, FIRE

Service providers are targeting specific customers with their initial offerings and pricing plans; these customers include telecommuters and small office/home office workers who seek high- speed Internet access and remote local area network (LAN) access.

To keep their initial offerings cost-effective, GTE and Thorn are concentrating their early efforts on high-rise apartment and business buildings where the loops are short and truck rolls can be kept to a minimum.

Covad Communications is targeting end users who use ISDN lines for LAN access. There are more than 3 million workers in the San Francisco Bay area and 900,000 of them use remote access to connect to their LANs. More than half of the 200,000 ISDN lines in the state of California, 95% of which are used for remote LAN access, are in the northern part of the state, Haas adds. Companies looking to increase productivity of their remote workers likely will upgrade to at least 384 kbps SDSL for the sake of productivity alone, and will justify the cost of doing so just as they justify the expense of their cellular phones.

COVERING THE BASES

Haas says believes it's essential for Covad to offer some kind of DSL service its entire market. Thus, in addition to ADSL and SDSL, the competitive local exchange carrier (CLEC) is offering 144 kbps ISDN DSL (IDSL) to the 30% of its potential residential customers and 20% of its potential business customers to which it cannot deliver the higher bandwidth services.

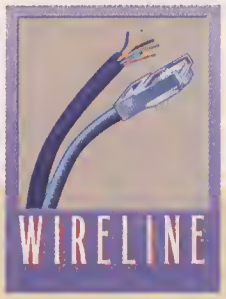
Thorn Communications expects to reach 40% penetration of each building it provides xDSL service to for Internet access within the next 2.5 years, says Anthony Spina, president of the ISP, which has filed for CLEC status.

"I've seen overblown numbers that say penetration for the service will reach 80%, but you'd be shocked at how many businesses are not yet even connected to the Internet," Haas says, adding that Thorn Communication's xDSL service pricing plan didn't come easy, and was reached only after "grueling, arduous months of poring over spreadsheets." ■

Initial commercial xDSL pricing

Provider	Location	Name of service	Speeds (down/up)	Installation charge	Monthly charge	Internet access included	xDSL equipment s supplier
Ameritech	Ann Arbor, Mich.(Chicago, mid-'98)	Ameritech.net High Speed Internet Service	1.5 Mbps/128 kbps	$150	$49.95	Y	Alcatel
CADVision	Calgary, Alberta	CADVision 2000K (residential) CADVision 7000K	2.5 Mbps/1Mbps 2.5 Mbps/1Mbps 7 Mbps/1 Mbps	$400 $99 $400	$1095* $435* $1450*	Y	Paradyne
Covad Communications Co.	Silicon Valley, Calif. (San Francisco, Santa Cruz, San Jose, 1Q 98)	TeleSpeed	384 kbps/384 kbps 1.1 Mbps/1.1 Mbps 1.5 Mbps/384 kbps	$325 ↓	$125 $195 ↓	N	Diamond Lane Communications: Cisco Systems Inc.
GTE Communications Corp.	TBA (1Q 98) Marina Del Rey, Calif.	ADSL OnSite (business) (residential)	1.5 Mbps/384 kbps 680 kbps/256 kbps	$500 $250	$700 $125	Y	Westell Technologies Inc.
SBC Communications Inc.	Silicon Valley, East Bay area, Calif.; Austin, Texas	FasTrak DSL (business) (residential)	384 kbps/384 kbps 1.5 Mbps/384 kbps 384 kbps/384 kbps 1.5 Mbps/384 kbps	$125 (SBC charge†) $450 to $700 (CPE/wiring installation†) ↓	$135/$150 (Calif./Texas) $250 $80 $150	N	Alcatel
Thorn Communications Inc.	"Silicon Alley," New York City	No name yet (business) (residential 1Q 98)	640 kbps/272 kbps 960 kbps/408 kbps 1.6 kbps/ 680 kbps 640 kbps/272 kbps (tentative)	$750 ↓ $200 to $400 (tentative)	$400 $500 $600 $75 to $100 (tentative)	Y	Paradyne
U S West	Phoenix	MegaBit Services	192 kbps/192 kbps 320 kbps/320 kbps 704 kbps/704 kbps	$199 to $299 ↓	$40 $60 $125	N	Pair Gain Technologies

*paid per year, up front
†SBC, CPE/wiring installation charges apply to all offerings.
note: All offerings use RADSL, except for U S West MegaBit Services, which uses single-wire HDSL.



Notebook

ANNIE LINDSTROM

LNP UPDATE

At press time, **Ameritech** (Chicago) continued to protest the Federal Communications Commission's (FCC's) failure to delineate a cost-recovery mechanism that telephone companies can use to recoup the cost of implementing local number portability (LNP) in their networks. The regional Bell company has declined to turn up LNP in its Chicago and Detroit markets, despite the fact that both are ready to go, until such a ruling is made. According to unnamed sources, the FCC likely will rule on the issue in February, which would save Ameritech from missing the FCC-imposed deadline of delivering LNP to its Phase One cities by March 31.

In November, Ameritech tried, but failed, to get the Illinois Commerce Commission (ICC) to approve a three-year, $170 million tariff on all of the access lines in the state of Illinois to pay for its LNP-related expenses. The ICC staff recommended that the commission decline to approve the tariff and instead open up an investigation of the LNP cost issues, according to an ICC spokeswoman.

Ameritech was expected to turn up LNP first, but **Bell Atlantic** was the first Bell company to turn up service—in Gaithersburg, Md., on Oct. 30 and in one central office (CO) in Philadelphia on Oct. 31. Bell Atlantic has since added 17 COs in New York City and one in Baltimore.

WESTELL TAPS SEAZHOLTZ

It looks like John Seazholtz will keep his ties to the telecommunications industry after he retires from his post as Bell Atlantic's chief technology officer next month. **Westell Technologies Inc.** (Aurora, Ill.) recently appointed him to its board of directors. It's a natural fit, because Seazholtz recognized the potential of asymmetrical digital subscriber line technology (ADSL) well before his peers and he spent his last years at the Bell company overseeing ADSL trials based on Westell's ADSL equipment.

In related news, **Westell** and **Lucent Technologies** (Murray Hill, N.J.) inked a joint marketing agreement under which Lucent will market Westell's SuperVision DSL access multiplexer (DSLAM), which Westell plans to roll out this quarter. The agreement also allows the companies to market and sell ADSL products developed by Westell for Lucent's ADSL-enabled SLC digital loop carrier systems, the first of which will be available in the fourth quarter of 1998.

Westell also announced that Ameritech plans to equip its network with Westell's new Proact family of T1 network interface units (NIUs) with performance monitoring. The T1 NIUs provide a comprehensive set of maintenance loopback functions plus a real time performance reporting feature that implements American National Standards Institute's Network Performance Report Messaging (NPRM) standard, whichlets telcos proactively respond to circuit performance degredations before significant problems occur.

INTERNET CHECKS IN AT CALIF. HOTELS

Never mind the mint on the pillow, business travelers can now get high-speed Internet access at three California hotels thanks to **@HomeNetwork** (Redwood City, Calif.) through its **@Work** division and **The Fourth Communications Network Inc.** (San Jose, Calif). The companies began deploying the new services last quarter and announced plans to expand nationwide in the first half of 1998. Service is available in the lobbies of the Hyatt San Jose Airport, the Crowne Plaza Hotel in Redondo Beach, and at the Ritz Carlton Hotel in San Francisco.

The service is supported by @Home Network's regional data center and an all fiber network that delivers data to the hotel. Information is disseminated through a central high speed router located in the hotel. From the router it is carried to secure Ethernet 10Base-T hubs, which are connected via Ethernet wiring to the lobby or rooms in which data ports have been installed.

NEW "HELP" FOR ISDN

Got a question about integrated services digital network (ISDN)? People who do can turn to **EiconTechnology's** (Montreal) ISDN Zone, a non-commercial Web site for people who want the "latest and greatest" information on the technology. Located at www.isdnzone.com, the site provides basic information on the technology, more in-depth explanations including technical details, a questions and answers section, a comparison of ISDN vs. 56 kbps modems and a showcase of applications, says Victoria Salvador, marketing programs manager for Eicon."In its first 10 days, we have had more than 2,000 visitors to the site," Salvador says. "We are trying to educate the masses about ISDN. There is a lot of confusion out there and we are trying to make it easy to get answers in one place. The site is graphically pleasing and points to other places where people can get more information."

The site has won a Cool Site of the Day from Cooldot.com and *Windows* magazine listed www.isdnzone.com as a Hot Site of the Day. The site, aimed at end users, also includes a list of telcos and Internet service providers (ISPs) that support ISDN. Telcos and ISPs that want to be listed on the site can submit details to be listed by Eicon by filling out a form located on the Web site, Salvador says.

The site does not yet list tariff information. However, it may in the future. In the meantime, selected ISDN tariffs are listed on a Web site compiled by James Love, director of the Consumer Project on Technology at www.cptech.org

DAVID KOPF

Multicast services shape up

GTE, UUNet get down to business.

AS INTERNET SERVICE PROVIDERS (ISPs) ROLL OUT INTERNET PROTOCOL (IP) MULTICAST SERVICES, DIFFERENT BUSINESS MODELS ARE UNFOLDING. MULTICASTING CONSERVES VALUABLE BANDWIDTH OVER UNICASTS; HOWEVER, THE TECHNOLOGY ALSO OPENS UP A RANGE OF SERVICES TO ISPS.

GTE Internetworking (Cambridge, Mass.) recently unveiled its ProVision service, a combined quality of service (QoS) and multicast offering, according to Rich Blatt, ProVision service line manager. "We are really looking forward to providing more capabilities that demand more of the network," he says. "So from a functional purpose, we want to deliver more applications, more services. From a business standpoint, we envision higher value services than what is being offered today."

SERVICES SHAPING UP

GTE, according to Blatt, envisions three multicast service areas for ProVision:

- The business education market via distance-learning applications;
- Narrowcasting of tailored content for smaller audiences; and
- A virtual private network (VPN)/QoS initiative geared toward customers that need multicast-based, managed file transfers or data backup/mirroring-type applications.

Narrowcasting applications may appeal particularly to companies operating internal content which they may want to broadcast to customers or outside contacts, Blatt says. This can be a highly desired service for financial companies, where sharing up-to-the-minute information with a variety of contacts is crucial. "There are lots of proprietary applications in the financial sector that may be data-intensive, but that have a critical, real-time component that's part of them," Blatt says. "So we've been talking to those people about how to push that data out to their constituents."

THE RESIDENTIAL MARKET

Although business customers likely will lead the user charge toward multicast services, residential multicast services aren't too far away. "[The business market] is the area that we've concentrated on the most," Blatt says. "We're from BBN, and BBN historically provided connectivity to corporate customers.

"However, GTE has had a lot of activity in a couple of areas, primarily [asymmetrical digital subscriber line] services that lend themselves very nicely to consumer sector," Blatt continues. "Once you solve the last-mile issue, all these apps can be opened up to the home as well."

For example, residential narrowcasting applications could link communities of interest within a limited geographical area—town, block or school. Multicast also could provide consumer multimedia content that might have broader appeal in the entertainment or gaming arenas, Blatt says.

BILLING MODELS

How ISPs will charge for multicast services is still up in the air. Will they charge on a per-packet basis or timed basis? Who pays—the sender, receiver, or both? "I don't know if there's any crystallized trend; this is where you can get philosophical and compare typical telco apps to typical cable apps," Blatt says. "One tells you the sender pays and the other tells you the receiver pays."

Traditional billing practices might not apply to, say, an online rock concert. Instead of a concert hall, the venue is the Internet, but the economics remain the same.The show's promoter may pay to multicast the event, but recipients would pay as well, he explains.

Moreover, a stream's value may be related to its content. For example, in a distance-learning application in which recipients pay $2,000 in tuition, the ISP may want a cut of that amount rather than a standardized fee.

"It's less our intent to charge people by the minute or the kilobit, and more to charge for a service that they receive today," Blatt says. "It's just that the bill might look different. It might be bundled in with services users might be receiving from us or some intermediate provider."

An alternative is a constant billing scheme. For its UUCast Service, UUNet Technologies Inc.(Fairfax, Va.) charges senders of multicast streams according to transmission size, according to Alan Taffel, vice president of business development. Customers must have a 56 kbps or 128 kbps connection, and are charged $2,200 per month for a 5 kbps stream, and $10,000 per month for 25 kbps stream.

However, these billing schemes, for now, are limited within ISPs' private multicast networks. Further issues to sort out include how ISPs will bill users once multicast network peering becomes reality. ■

INTERNET Notebook

DAVID KOPF

AT&T WORLDNET TARGETS BUSINESS USERS, ADDS VERISIGN

Setting its sights on small- and medium-sized companies, **AT&T WorldNet** (Basking Ridge, N.J.) has launched AT&T WorldNet Business Dial Services, a collection of business-oriented, dialup Internet services such as e-mail accounts, expanded billing options, domain names, business-specific Web content and international roaming.

Priced at $24.95 per month, per user, Business Dial Services offers unlimited Net access, a 10 MB POP3 account, corporate invoicing, 24-hour technical support and client software including Microsoft Internet Explorer or Netscape Navigator, Transmission Control Protocol/Internet Protocol (TCP/IP) stack and dialing software.

A $29.95 expanded e-mail plan lets customers use an InterNIC-registered domain name in their e-mail address. The plan also provides customers with 30MB of e-mail storage space per user. Businesses also can order e-mail-only accounts, which offer access to 10 MB e-mailboxes at $7.95 for the first two hours and $2.50 for each additional hour.

Business users also will be able to integrate their Internet services with their AT&T voice services via AT&T's ALL invoice, which integrates billing for the Business Dial Service along with long distance, toll-free, international, in-state, IntraLATA, local, business calling card and AT&T Wireless Services.

AT&T also will offer Business Dial Service customers access to international IP roaming services that will begin trialing Q1 1998. Internet roaming enables users of one Internet service provider (ISP) to dial into points of presence (POPs) that may belong to other ISPs that have arranged access with that ISP. Once open to business users, the roaming service will offer access to the Business Dial Service from more than 100 countries. Roaming is available in the Asia-Pacific region via **AT&T Jens** (Japan), an AT&T subsidiary. Business Dial Service will also offer local dial-up access in Puerto Rico and the Virgin Island beginning this month.

In related news, starting at the beginning of this year, AT&T will offer **VeriSign Inc.'s** (Mountain View, Calif.) digital certificates for businesses needing Internet security services. VeriSign has issued more than 1.5 million digital IDs to individuals and 35,000 server IDs.

Digital certificates, also known as digital IDs, function much like electronic credentials over the Internet for users as well as Web sites. The certificates validate the identity of users for access to sites, communication and electronic commerce. The server IDs provide secure communications and transactions through Secure Sockets Layer (SSL) protocol, and verify websites' identities so that users can be sure the organizations they think they are dealing are, in fact, who they claim to be.

PSINET, UUNET FLEX MULTIMEDIA MUSCLE, ROLL OUT STREAMING

UUNet Technologies Inc. (Fairfax, Va.) and **PSINet Inc.** (Herndon. Va.) have unveiled real-time and on-demand video and audio streaming services.

UUNet will host audio and video streaming for customers, which it will serve up live with its UUCast multicast or on-demand via standard unicasts. PSINet has unveiled a service suite called PSIWeb Multimedia Hosting Services, which includes PSIWebMedia, audio and video production services and a full-service Internet broadcasting service called TV on the Web Live.

UUNet will offer both NT- and Unix-based services, with **Microsoft Corp.'s** (Redmond, Wash.) NetShow 2.0 server backing the former and **RealNetwork's** (Seattle) RealSystems server version backing the latter. Unicast fees include a base monthly charge plus those based on the amount of outbound traffic per month. UUCast services start at $2,200 per month for a 5 kbps stream, with server fees starting at $3,000 per month.

PSINet's Multimedia Hosting Services uses RealNetwork's server technology. TV onthe Web Live will include on-site production, data compression, signal distribution and Web hosting services geared specifically for broadcasting Internet events.

BELLCORE LAUNCHES NEW UNIT TO PROVIDE INTERNET SOLUTIONS

Bellcore (Morristown, N.J.) has unveiled a new business unit, **Soliant Internet Systems** (Piscataway, N.J.), which is dedicated to developing business-class voice-over-Internet Protocol (IP) solutions. According to Bellcore, within the next two years Soliant will develop voice/IP services to be as robust and easy to use as the public switched telephone network (PSTN).

The new business unit will target existing and merging telecommunications carriers, cable operators, Internet service providers (ISPs) and *Fortune* 1000 enterprises. Soliant will develop products in three main areas: Internet infrastructure, voice/IP and Internet commerce.

"Our first priority is to make today's public Internet and the emerging business-class Internet robust, reliable and cost-effective places for business-to-business commerce," says Jac Simensen, vice president and general manager of Soliant. "We expect that, over the next two to three years, most business-to-business traffic will move off the public Internet and onto more robust, parallel, business IP network offering both data and voice services."

Where Internet infrastructure is concerned, Simensen says ISPs will need to offer optional cost and quality of service levels, as well as voice and integrated messaging services to differentiate themselves from competitors and rise above the competitive fray. Billing and customer service technologies also will factor into an evolution from ISPs to "enhanced service providers" (ESPs), he adds, as the ISP market "dramatically" evolves over next two years.

A key component to the Soliant strategy is the formation of alliances with Internet players, such as **Sun Microsystems Inc.** (Menlo Park, Calif.), which jointly announced with the Bellcore spinoff that the two would market the Soliant Advanced DNS system, which is geared toward speeding up Internet traffic by reducing the number of times hosts ask Domain Name Servers (DNSs) to validate IP addresses.

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RECALL
FROM THE AMERICA'S NETWORK ARCHIVES

A Nov. 1, 1964 article in *Telephone Engineer and Management* reported the usage of the Bell seal, corporate symbol AT&T, Western Electric, Bell Telephone Laboratories and the Associated Companies became standardized. After much discussion, the seal was standardized for use on advertising, promotional literature, product markings, stationery, plant signs and wherever visual identification of the Bell System, its products and services were employed.

The reason? As explained in the company's manual: "The Bell seal is one of the most recognized trademarks in the country, yet the public is often confused about the corporate characteristics of AT&T, Western Electric, Bell Telephone Labs and their relationships with the Associated Companies."

Apparently, there were misconceptions about the extent and types of services offered by the Bell System. Also, there was too little understanding that the Bell System was a system and not a company, according to the manual.

Talk about an identity crisis.

VISITATIONS— FROM A SAFER DISTANCE

Forget those Plexiglas visits if you know someone whose home is the Pinellas County Jail in Clearwater, Fla. A mega-videoconferencing unit, touted as the world's largest visitation system—by Datapoint Corp. (San Antonio)—is being installed. The first phase of the $680,000 project includes a 112-seat configuration designed to service maximum-security inmate visitation at the 2,261-bed facility. Visitors will enter a separate building across the street from the jail for exchanging conversations online with prisoners.

The new visitation system will improve security and reduce the risk of drug and other contraband traffic, says Everett S. Rice, Pinellas County sheriff.

The system also will provide an opportunity for extended visitation times. Moreover, minors, who previously were not permitted inside the jail to visit inmates, will have the chance to see (from a safe distance) what life on the inside is like.

"By maximizing the use of this video communications technology, we can reduce the costs for visitation, interviews and interrogations across a large number of departments," Rice says.

WRISTWATCH PHONE TO DEBUT AT JAPAN OLYMPICS

There will be more than fearless athletes making their debut at the Nagano Olympics in Tokyo.

NTT Corp., Japan's largest telecommunications company, plans to debut at the games a wristwatch telephone that uses spoken commands to replace dialing.

Based on the personal handyphone system (PHS), the watches weigh 1.58 ounces, run on a lithium-ion battery and provide one hour of continuous talk time, according to NTT. It can also be removed from its strap and worn as a pendant. (Does this mean they'll catch on like Nano Pets?)

Forty of the devices will be lent to officials of the Nagano Olympic Committee for use during the upcoming Nagano Winter Olympic, says an NTT spokesperson.

NTT plans to make further improvements to the phones, based partly on feedback from the Olympic officials, before putting then on the market, likely within two years, according to the spokesperson. The current test model is the first such combined wristwatch and telephone in Japan.

PHS is being touted as an alternative digital cellular telecommunications standard that uses more numerous, short-range relay stations for lower-cost communications than with traditional cellular systems. The PHS system, which was developed in Japan, began operations in July 1995.

—Debbie L. Sklar.

DEBBIE SKLAR

Carriers choose CAOS for seamless roaming management

The Cellular Administration and Operations Support Service (CAOS) helps wireless carriers increase efficiency, security and accuracy by providing a centralized exchange point that eliminates the need to notify roaming partners of updates via fax. CAOS also combines roaming data management with assistance in establishing new mobile switching centers (MSCs). It eliminates many complexities associated with bringing new MSCs online, and lets carriers update their switches with mobile identification number (MIN) range information to allow roaming partners' subscribers to roam in the carrier's market area.

Carriers save time by using just one database for entering and receiving updates. Network operators receive a clearly established schedule for performing updates. CAOS dramatically reduces the need for switch-to-switch interoperability testing by using established test beds.

"ILLUMINET is providing an industry solution for carriers to simplify their roaming," says Jim McGarrah, director of network services of BellSouth Cellular Corp.

Recently, United States Cellular, BellSouth Cellular Corp., Illinois Valley Cellular, Cellular Plus and First Cellular of Southern Illinois chose CAOS to manage seamless roaming as they expand into new markets and establish roaming agreements with other carriers.

CAOS features:

- Interoperability testing—connection and testing of new MSCs and MSC switch generics are coordinated to establish seamless roaming among partners.
- Centralized data management—carriers maintain switch site and MIN range information in a database accessible via the Internet.
- Fixed schedule for updating information—CAOS provides carriers a fixed schedule for updating MIN range information and switches, so carriers can plan workloads and communicate internal time frames.

ILLUMINET (Olympia, Wash.)

Visit www.illuminetss7.com or Circle 200

Source: Illuminet

Wireless Product Focus

Paging multiplexer

The Axxess/1 paging multiplexer provides access, via satellite, from a service provider's switching centers to remote paging transmitters. In addition to low-speed support, the multiplexer also handles newer, higher speed protocols.

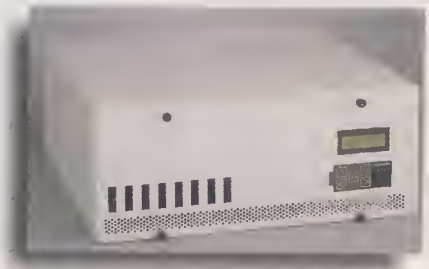
The multiplexer provides digital and analog signals simultaneously and has been designed to interface directly with an analog or digital paging terminal. The system provides a low-cost virtual link between a centrally located paging terminal and remote paging transmitters. No separate conditioning or conversion units are needed.

The Axxess/1 system consists of two parts: the Paging Control System (PCS) and the Paging Remote System (PRS). The PCS provides fully redundant multiplexers at the switching hub, and includes a paging redundancy control unit for automated switchover. The PRS consists of multiplexers used with paging transmitters and does not include redundancy.

The multiplexer is configured for clear-channel RS-422/V.35 aggregate interface and can provide 47 user-selectable rates from 1.2 kbps to 2.048 kbps. One multiplexer can handle up to 32 analog channels or 16 digital channels. Systems can be extended to 60 and 92 channels through the use of cascading multiplexers.

DNE Technologies Inc. (Wallingford, Conn.)

Visit www.dnetech.com or Circle 206



LMDS design services

MLJ Consulting Telecommunications Engineers are rapid and economical design services for local multipoint distribution service (LMDS) systems. Market demand, line-of-sight obstructions, rain fade, desired system reliability, and facility network access are taken into account; the result is a customized, preliminary system design for a specific market which provides hub locations, local phone company interconnect points, counts and types of hubs needed, daytime population, businesses and residential population served.

In cooperation with the Strategis Group, MLJ offers an LMDS revenue forecast and capital expenditure analysis. Using exclusive LMDS software, the companies combined demand and mapping data to produce easy-to-understand, preliminary design maps and a spreadsheet, enabling customers to estimate the costs and revenues associated with their particular system design and business case.

MLJ (Arlington, Va.)

Call 703/741-3500 or Circle 202

Receiver front-end system

The Reach receiver front-end system expands base station coverage and reduces the number of cells sites needed in the network. System benefits include: reduced capital expenses, accelerated time to market, optimized cell site performance, lowered receiver noise floor and increased customer retention.

The system provides clean, high-quality calls; lower handset transmit power; longer battery life; improved in-building penetration; and fewer dropped calls.

The Reach system is available for U.S.Cellular, PCS and GSM networks, and SCT also can be tailored to other standards.

SCT Raychem (Golden, Colo.)

Visit www.reachsct.com or Circle 204

Prepaid cellular software

Prepaid cellular software available on the US/Intelicom-150 cellular phone permits a carrier, reseller, dealer, distributor or retailer to electronically approve airtime additions for the prepaid client, via the handset, without the need for PIN codes or operator assistance.

Prepaid cellular customers can request that the purchase of additional prepaid time be applied against a credit card, secured credit card, debit card, bank account or a current house account. The application lets the dealer's credit verification system to authorize the request for additional airtime. Once electronically authorized, the system automatically adds time to the phone without a PIN code or complicated input instructions. Adding time and debiting the client's account can be accomplished electronically in less than one minute.

The software release incorporates all previously announced features, including Quick Start, automated NAM programming, pre-and post-pay on the same phone, automatic "A Key," and an Internet support system for dealer billing information and ESN management.

US/Intelicom (Atlanta)

Visit www.usintelicom.com or Circle 201

Repeaters get FCC nod

FCC type approval has been given to Communications Extender (ACE) 1312 and ACE 1316 series RF band selective repeaters. The type approval allows for total distribution network integration and operation of the repeaters in applications such as direct off-air pickup and retransmission of 800-960 MHz signals for coverage enhancement in RF shadowed areas.

The ACE 1312 series repeater is designed for 800 MHz trunked radio systems. The ACE 1316 series repeater covers 900 MHz trunked radio and 900 MHz GSM services. The repeaters' rugged design, with fanless cooling systems and stainless steel enclosures, makes them suitable for use in harsh environments.

Andrew Corporation (Orland Park, Ill.)

Visit www.andrew.com or Circle 203

Tower amps for PCs

Two low-noise, tower-mounted PCS amplifiers are available. The SA1032 simplex amplifier delivers 14 dB of gain with a noise figure of 2.0 dB and a third-order input intercept point of +8 dBm. This unit features lightning protection and an integrated low-loss bandpass filter. The SA 1079 dual duplex amplifier offers 12.5 dB of gain, a 2.5 dB noise figure and a third-order input intercept point of +8 dBm. This model is also lightning-protected and features integrated low-loss duplexers.

Watkins-Johnson Co. (Palo Alto, Calif.)

Call 650/813-2375 or Circle 207

To Our Readers:

Due to an error in the printing process, the December 15, 1997 issue of America's Network mailed with two pages that were repeated from the previous issue. The correct table of contents of the December 15 issue, and a new From the Editors column, can be accessed through the America's Network web site at http://www.americasnetwork.com. We apologize for any confusion, and we thank you for your understanding.

Sincerely,

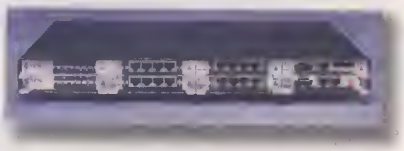
Paul Semple
Publisher

Wireless Products continued

Mini cross-connect for wireline, wireless

The digital microFlex is a compact cross-connect that lets cellular and PCS carriers establish more efficient transmission networks.

The system is designed for wireless and wireline applications. In wireless networks, it offers carriers flexibility in applications and network control by enabling them to consolidate and remotely balance traffic loads at unstaffed points of the network site, such as at the cell site. It is the first miniature cross-connect switch to handle 16T1 or E1 lines in a single rack unit of space, according to the company.



Aggressive growth in cross-connect switching hubs for wireless networks is expected, as PCS services are deployed in the less-populated areas of the United States. These areas require less bandwidth for transmission to the central office.

A T1 version of microFlex is available through the company, as well as resellers and distributors.

Digital Transmissions Systems Inc. (Norcross, Ga.)

Visit www.dtsx.com or Circle 203

Interference reduction system

The Autoclear smart antenna interference-reduction system is being tested at a Bell Atlantic Mobile cell site in New York. Autoclear is designed to improve the call quality for wireless customers.

Autoclear can be quickly integrated into existing wireless infrastructures, successfully goes "live," and provides measurable and verifiable improvements in voice-call clarity while reducing the number of dropped calls.

Incorporating digital technology in its design enables the Autoclear smart antenna system to demonstrate dramatic improvements in voice quality and a reduction in the number of calls dropped from the system due to co-channel interference.

The New York metro area is regarded as one of the most severe radio frequency environments in the U.S. and requires seamless integration into the existing wireless infrastructure. Upwards of 40 db in improvements have been shown. The results of Autoclear testing in the New York trial demonstrated dramatically improved service to customers through improved voice call quality and fewer dropped calls.

Autoclear easily installs into cell sites and uses existing antennas. Incorporating advances in digital signal processing (DSP) technology, Autoclear does not require the installation of new antennas—a major advantage in markets where installation is restricted by the costs of new construction permits and zoning considerations. *Argosystems (Sunnyvale, Calif.)*

Visit www.argosystems.com or Circle 208

Products and services

E1 transcoder

The Model 9102A E1 (CEPT) 2:1 transcoder transcoder reduces an operator's recurring leased facility costs by as much as 50% by converting two 30-channel E1 PCM streams into one 60-channel ADPCM composite stream. Applications include long distance, cellular, mobile radio, satellite and private networks.

The 9102A incorporates the ADPCM algorithm (ITU-T Recommendation G.721), as well as an enhanced ADPCM algorithm that allows 9.6 kbps in-band modem traffic and Group III facsimile to be passed on compressed channels.

The 1.75" x 19" x 15.75" unit is programmed from the front panel with an alphanumeric, user-friendly display or by remote terminal through the EIA-232-D port. The front panel or remote terminal can display system setup, alarm and diagnostic information for A, B and C interface ports. Configuration parameters are stored in non-volatile memory for power failure protection. Safeguarding of the B stream is provided when a transcoder power failure occurs.

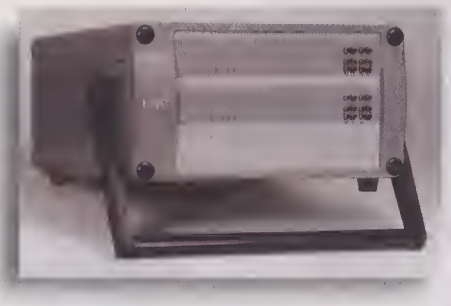
Pricing for the Model 9102A transcoder starts at $5,600 for a dual chassis with one transcoder module.

Aydin Telecom (Horsham, Pa.)

Visit www.aydin.com or Circle 214

Call-problem analyzer

The Model E2D call-problem analyzer has digital T1/E1 interfaces that simultaneously capture activity on up to 96 DS0 channels. A Model E2D companion module can be connected to the H2D to analyze channels on two additional T1 circuits. The standalone units provide full remote access via a standard modem and PC. Lightweight and portable, the analyzers can be used at the desktop or in the field.



Ellipsys Technologies Inc. (Soquel, Calif.)

Visit www.ellipsystech.com or Circle 211

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February 1	Timing & Synchronization/Optical Switching	January 8
February 15	Wireless Data	January 21
March 1	Network Management	February 6
March 15	Intelligent Networks	February 20

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ART BROTHERS

Gravy trains

How many taxes do you collect for others?

The United States Telephone Association (USTA) held its hundredth anniversary gala celebration. Industry "old timers" were present. Great things were in the offering.

I thought maybe the 100th would be a grand time for the board to invite all the "new" telephone companies to join. Not one peep. The reception reminded me of how penguins herd back and forth as they shuffle thither and yon.

One economist said it is reasonable for mandated programs to be loaded on telecom users. For each dollar of competitive savings, the same amounts should be available for social welfare stuff.

The talking-head technical sessions elicited a cogent comment; the National Carrier Exchange Association (NECA) technical session (held the prior week in Las Vegas) had the "soul" of the (attendees), which was observed in Chicago. I regret to think that the gala did not seem to have much purpose other than to schmooze and try to have some fun.

TAX AND SPEND

We telcos are fat cows. Moreover, we're cash cows. There are seven taxes each month that I collect for others:

- The $3.50 or $6 Federal Communications Commission (FCC) mandate is also a line item, but we keep that.
- Eighteen cents to pay for the deaf network.
- Federal and state sales taxes account for 9% of the bill.
- A half cent per minute on state toll to fund Utah's $2 million - plus Universal Service Fund (USF).
- The 911 network costs 50 cents per month.
- As I understand it, the dough to pay for the school and library network.
- Health care network can cost up to two-and-a-half cents per minute on toll.

One economist said it is reasonable for mandated programs to be loaded on telecom users. For each dollar of competitive savings, the same amounts should be available for social welfare stuff. So half of all amounts paid by customers for telecom would go to social welfare. We're getting there.

WHO IS ELIGIBLE?

In addition to the social mandates aforementioned (that's lawyer talk) policy, the new Telecommunications Act says that for us telcos to get paid for providing specialized network stuff, we have to be designated and eligible telecommunications carriers.

The easy way to accomplish this was for the several states to send a letter to the new, federally mandated agency, affirming which service providers in their state are eligible to receive continued USF and payment for providing non-compensatory services for schools, libraries and health care.

As this is written, most consultants and Public Service Commission (PSC) staff were humping to get the required documents signed and delivered. All eligible rural companies in Utah listed their joint specifications on three pages. That commission will approve it by a single, December order naming all the eligible carriers.

SIT ON IT

On the other hand, my separate Nevada company has a problem. It has 11 years of corporate Nevada operations. Three exchanges. Tax returns. Bank accounts. NECA payments. FCC tariffs. No certificate. Administrative oversight.

To qualify as a designated carrier, my Nevada company filed with the Nevada PSC (NPSC) to correct the oversight with a certificate order in April 1997. That's being sat on. If they don't do anything, we stand to not get paid $7,500 per month from NECA in USF plus other payments for Schools and Libraries Corporation (SLC) and health care.

I question how professional it is to put us at risk this way. My curiosity got their engineer so mad, he hung up on me when I called to ask how he spelled his last name. Geez, enough already.

When Art's not chewing his cud, he wrangles the herd at Beehive Telephone Co. and can be reached at artb@beehive.net.

HO HO HO

But wait, I forgot that this is the season of giving, isn't it? As of press time the FCC says we're supposed to be designated as an eligible carrier by Christmas—a merry prospect.

I'm told if the state doesn't designate, it may have to cough up the dough to pay us out of its own USF. *Sure* ... Stay tuned. ■

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